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CONTENTS.

Original Communications.

PAGE

Observations on the Action of Chloroform on the Functions of the Human Brain and Spinal Cord, as witnessed in Extensive Injuries of the Cranium and Brain. By Bedford Brown, M.D. 793
The Treatment of Diphtheria. By John L. Heffron, A.M., M.D. 801
A Plea for Venesection. By George C. Laws, Ph.D., M.D. 806
The Preparation of Surgical Catgut. By Arthur Woodward Booth, M.D. 810
Possible Relationship between the Tubercular Diathesis and Nitrogenous Metabolism. By Samuel G. Dixon, M.D. 819
Amputation of Both Legs at the Knee-Joint for Paralytic Club Foot in a Case of Spina Bifida and complicated by Congenital Inguinal Hernia. By William J. Taylor, M.D. 822

Leading Articles.

The Treatment of Appendicitis 826
Operation for Cure of Carcinoma of the Breast 828

Reports on Therapeutic Progress.

The Influence of Atropine upon Respiratory Volume 825
Germain Sée on Ferratin 830
Potassium Nitrate in the Treatment of Phlegmasia Alba Dolens 830

PAGE

Treatment of Hernia in Children 831
Local Anæsthesia 832
Benzonaphthol and Bismuth Salicylate in Summer Diarrhœa 833
Conjunctivitis, Acute and Chronic 834
Choice of Anæsthetic for Removal of Naso-Pharyngeal Adenoids 835
The Management of Face Presentation 836
Treatment of Typhoid Fever 838
The Cold Poultice as an Antipyretic in High Grades of Fever 838
Some Points in the Treatment of Typhoid Fever 839
On the Effect of giving Levulose and Inulin to Patients suffering from Diabetes Mellitus 840
Malaria and its Therapeutics 841
The Hypodermic Administration of Mercury 843
Symphyseotomy for the Relative Indication, with Complications 843
Note on the Past and Future of Venesection 844
The Treatment of Certain Symptoms of Croupous Pneumonia, particularly in Adults 845
Treatment of the Exanthemata 848
Mechano-Therapy in Chronic Diseases of the Heart 848
Treatment of Whooping-Cough 848
Value of Direct Massage of the Cornea as an Agent in the Treatment of Corneal Opacities 849
Pilocarpine in the Treatment of Acute and Chronic Urticaria 849
Treatment of Cystitis in Women 850
Ichthyol-Zinc Paste as a Treatment for Eczema of the Female Genitals 851
Treatment of Furunculosis 851

PAGE

Treatment of Puerperal Infection 851
Treatment of Some Frequent Maladies of Children 852
The Influence of the Abortive Treatment of Syphilis on the Nervous System 853
Vicarious Menstruation 854
Physiological Rest in the Treatment of Prolapse of the Rectum 854
Technique and Indications of Vagino-Fixation 854
Operation for Removal of Enlarged Cervical Glands 856
Treatment of Pott's Disease 856
An Antiseptic Dusting-Powder 857
The Danger of Anæsthetizing Diabetics 857
The Treatment of Sprains and Disabled Joints 857
Treatment of Vaginitis as pursued at Hospital Saint-Lazare 858
Subcutaneous Injection of Artificial Serum in Serious Hemorrhage 858
Treatment of Metrorrhagia 858
Antiseptic Treatment of Burns 858
Treatment of Herpes and Folliculitis Vulvæ 859
The Operative Treatment of Perforative Ulcer of the Stomach and Intestines 859
Revolver Wound of Skull 860
Sterilization of Catgut 861
Craniectomy in Microcephalus 861
Operation in Peritoneal Adhesions 861

Reviews 862

Notes and Queries.

Diphtheria Antitoxine 864
The Index Medicus 864

Original Communications.

OBSERVATIONS ON THE ACTION OF CHLOROFORM ON THE FUNCTIONS OF THE HUMAN BRAIN AND SPINAL CORD, AS WITNESSED IN EXTENSIVE INJURIES OF THE CRANIUM AND BRAIN.

READ BEFORE THE SOUTHERN SURGICAL AND GYNÆCOLOGICAL ASSOCIATION, AT CHARLESTON, S. C., NOVEMBER, 1894.

BY BEDFORD BROWN, M.D., ALEXANDRIA, VA.,

Honorary Fellow and Ex-President of Medical Society of Virginia; Member of Medical Examining Board of Virginia; Ex-President of Southern Surgical and Gynæcological Association; Member of American Medical Association.

IN entering on this interesting and important subject, I am aware that I am engaging in a field of study and observation comparatively unexplored and unknown. The observations and investigations designed to be published to the world in this paper are based upon ocular demonstrations of the action of chloroform on the human brain, while exposed in extensive compound comminuted fractures of the cranium and laceration and injury of the membranes and brain-substance itself. Two most valuable and excellent opportunities have in the past come under my care and offered themselves for study and observation of this kind.

The first case of this kind which came under my care occurred in the year 1860, and was published in the October number of the *American Journal of the Medical Sciences*, and was extensively republished, but probably did not make the impression that it deserved because of the excitement and turmoil of civil war that

soon followed. The title of this paper was "A Case of Compound Comminuted Fracture of the Cranium, Severe Laceration and Destruction of the Brain, followed by Fungus Cerebri and terminating in Recovery."

The second case that occurred was that of a Confederate soldier in one of the great battles in Virginia.

In this case a ball or grape-shot as large as a hen's egg had entered the centre of the frontal bone or os frontis, penetrated the frontal lobes to the depth of an inch and a half, and had embedded itself in the cerebral substance and was tightly wedged in the frontal bone.

I will mention the fact here that in this case the ball was doubtless, for obvious reasons, a spent ball. The fractures in both of these cases were in the os frontis, and in both there was extensive injury and laceration of the frontal lobes of the brain and considerable loss of cerebral tissue. But, notwithstanding these extensive injuries of the organ in both, there was no loss whatever of consciousness or sensation.

In both cases the necessary surgical operations lasted over an hour, and, because of the acute sensibilities of the patients, the free use of chloroform was required during the entire operations and subsequent dressing of the wounds. In the first case the patient was brought under the anæsthetic compound of chloroform 3 parts, ether 1 part, as many as four different times, as the effects would pass off. In the second case the patient was placed under the effects of chloroform alone as many as three different times, so that the action of the exposed brain could be accurately observed and studied, both when under the influence of chloroform and when without it. To enable us to comprehend clearly the action of chloroform on the human brain exposed to the naked vision and to form an idea of the conduct of the organ in a state of anæsthesia, I will here quote portions of the history of Case I. relating to this question.

In this case the fracture occurred in a colored boy from the kick of a newly shod horse, and occupied a large portion of the os frontis; the opening in the skull would have measured two inches horizontally and an inch and a half in width. The fractured bones were driven into the frontal lobes fully an inch or more, lacerating extensively the membranes and lobes, considerable portions of the destroyed brain-substance having been forced out on the surrounding skin. A large amount of blood had escaped and was still escaping from the wound.

Notwithstanding this extensive injury, the consciousness and sensibilities of the patient were so acute and his resistance so uncontrollable that anæsthesia was imperatively required.

Having no guide to govern myself and assistant in forming an opinion of the effects of this class of agents on a brain so dangerously injured, we discussed the probable results with caution and deliberation.

Up to that time there had been no case placed on record of the use of anæsthetics in extensive injury of the cranium and brain, and consequently no experience in their effects in such cases, and I am not aware, even at the present time, that any such case has been placed on record since. Fearing lest the pure chloroform might be too depressing, I determined to use a combination consisting of chloroform 3 parts, ether 1 part, hoping that in some way the ether might counteract the depressing effects of the chloroform.

After the patient had been placed thoroughly under the influence of the anæsthetic, we found, on examination, that there was an opening in the os frontis two, or rather more than two, inches long, extending across the forehead, and one inch and a half wide, and the fractured bones corresponding to this opening had been driven back into the frontal lobes of the brain fully an inch in depth, lacerating the membranes and destroying the brain-substance to that extent. Ten or twelve pieces of bone, some two inches long, were removed, having been embedded in the brain, the loose portions of membrane cut away and removed, and then the lacerated and detached portions of brain-tissue, amounting to two tablespoonfuls, were carefully removed, and the wound, which was a ghastly one, was sponged out carefully with boiled water until all hemorrhage had ceased. Through this very extensive opening in the skull the brain could be seen perfectly exposed to view, and through it we could observe the physical action of the brain perfectly, both under the influence of chloroform and when free from it; and we could also observe its action under the influence of stimulants. There could not have been, under any circumstances, a more favorable opportunity to witness and deliberately observe the results of the action of chloroform on the functions of the human brain than this case afforded. On this large area of exposed brain we could see the effects of the anæsthetic plainly on the rhythmic pulsations of the brain, also its wonderful effects on the arterial tension and circulation of that organ, and, finally, on the cerebral hemorrhage.

On the peculiar action of chloroform on the

human brain, whether this agent tended to diminish or increase its circulation, whether it produced a state of anæmia or congestion of that organ, was, in the professional opinion, an unsettled question. The facts in this case, I think, settle this question definitely. We observed that the first perceptible effect of the anæsthetic on the action of the brain was, when under full anæsthesia, a marked and sudden diminution of hemorrhage, which previously had been free; then, when the anæsthetic influence subsided, there was return of active hemorrhage. This fact indicated to us that the action of chloroform was to lessen and reduce the cerebral circulation beyond a doubt, and when the wound had been cleaned of all *débris* of fractured bone, membranes, and lacerated brain, this supposition proved to be correct. The operation was in progress about one and a quarter hours, and during that time the patient was placed under the anæsthetic four different times, as the effects would subside. On these occasions, whenever the patient was fully under the effects of the anæsthetic, then the hemorrhage would subside, the rhythmic pulsations of the brain would cease, the exposed surface of the brain would lose its florid complexion and assume a decidedly pale and ashy appearance, and at the same time the respiration would become slow, the impulse of the heart become feeble, and the extremities rather cool and the pupil contracted.

On the contrary, when the effects of anæsthesia would begin to subside, then hemorrhage, at first slowly, would begin to return, the cerebral pulsations begin to reappear, and the organ would again assume a florid appearance, with indications of returning turgescence.

When the patient was fully under the influence of chloroform the circulating volume of blood in the brain became perceptibly reduced. On the contrary, when the effects of the anæsthetic passed off, the normal amount of blood returned to the brain, as indicated by the change from its pallid complexion to the florid appearance of congestion. These peculiar phenomena recurred as many as four different times in this case during the operation, and would indicate that death from chloroform does not result from congestion, but from anæmia of the brain.

The Combined Action of Chloroform on the Cerebral Pulsations and the Function of Respiration.—What connection has the function of respiration with the state of the cerebral pulsations? is a question not devoid of interest. In this, the first case, it was observed that whenever the pulsations of the brain were full, were of a heaving, impulsive character, the respiratory act was correspondingly full, deep, and complete. But as soon as these pulsations showed an indication to diminish in force under the action of chloroform, the respiratory act became slower, less deep and complete. These peculiar indications were so plain and perceptible as to attract our attention.

Effects of Struggling or Muscular Exertion or Mental Excitement on the Brain of the Patient while inhaling Chloroform.—The effects of these influences on the functions of the brain were positive and decided. Any struggling, attempt at resistance, unusual muscular exertion, or mental excitement produced marked and sudden, even violent, change in the cerebral circulation. In this case, after the wound was cleaned and the patient had regained consciousness, it became necessary again to resort to anæsthesia to insert the numerous sutures; the patient became violently excited and gave energetic resistance to our efforts to chloroform him. Immediately the hemorrhage returned, the cerebral pulsations became violent, and the brain intensely congested until complete anæsthesia was accomplished, when the excited organ became perfectly quiet, pale, and all hemorrhage ceased. Under the effects of mental excitement and muscular exertion, the cerebral pulsations became not only forcible, but exceedingly irregular, and there was always irregularity of the respiratory and cardiac action in corresponding degree. These facts teach us an important lesson in the administration of anæsthetics, and that is, to avoid, if possible, any mental excitement or physical exertion of the patient while undergoing anæsthesia, for the purpose of preventing violent and unusual changes in the circulation both of the brain and medulla oblongata, the centre of respiration. At this critical moment, when the system is on the verge of passing from a state of consciousness to one of profound insensibility, any violent excitement or sudden increase of the cerebral circulation or any considerable irregularity might give rise to a corresponding depression of circulation and produce fatal consequences. This important fact in regard to the effects of struggling or resistance on the circulation of the brain indicates to us very positively the necessity of using gentleness, caution, moderation, and the avoidance of force in the administration of chloroform. In this way all shock to the brain and centre of respiration may be avoided.

Case II.—This case was that of a Confederate soldier who was brought into my field hospital during one of the great battles near

Richmond, Va. A spent grape-shot as large as a hen's egg had embedded itself into the os frontis and to the extent of an inch and a quarter into the frontal lobes. The patient was perfectly conscious, sensible, and possessed perfect control over the muscular system. The ball was wedged tightly in the skull, and for its successful removal it was necessary to trephine a ledge of bone to enable us to use the elevator to force it out, and as the wounded man requested chloroform preliminary to the operation, he was placed thoroughly under the anæsthetic. I will state here that no ether was used, to my knowledge, in the Confederate army. After the removal of two semicircular pieces of bone, the elevator was passed underneath the ball and it was pried out, leaving a wound in the frontal lobes an inch and a quarter in depth, with all the fractured bones driven into the brain, lacerating that organ extensively. Under the action of the chloroform the hemorrhage had ceased and the cerebral pulsations were nearly suspended. After the wound was cleansed of all fractured bones, lacerated brain, and membranes, we had a wound two inches in diameter and an inch and a half in depth. Up to this stage of the operation the patient had been under the anæsthetic twice, and at each time the cerebral pulsations were very nearly suppressed, the hemorrhage ceased, and the surface of the exposed brain became pallid. On the contrary, when the effects of the anæsthetic passed off, the regular rhythmic pulsations would return, the hemorrhage be renewed, and the brain become florid. When beginning the administration of the anæsthetic, any struggling of the patient was certain to give rise to increased pulsation and activity of the cerebral circulation and symptoms of congestion, until unconsciousness ensued, when the same pallor of the brain and subsidence of rhythmic action and all hemorrhage invariably followed. These peculiar results invariably followed the action of chloroform in the second as well as in the first case. In this case the chloroform was administered as many as three times, and in every instance the results were identical in effect and in order.

The history of this case cannot be regarded in any other light than as a complete confirmation of the facts elicited in the first case: that the action of chloroform exerts a potent influence on the circulation of the brain; that it is not an excitant of that organ, and that it does not produce congestion of its circulation or even an increase; that it reduces cerebral circulation and its rhythmic movements; that it controls hemorrhage; and, finally, to be more definite, that it can reduce the circulation of the brain from twenty to thirty per cent., and while that state of anæsthesia continues, a temporary state of anæmia, not only of the brain itself, but of the medulla oblongata and spinal cord to a limited extent, results. It would appear that it requires a longer time and a larger amount of chloroform to produce a serious degree of anæmia of the medulla than of the cortex of the brain, as the anæsthetic influence is primarily on the cortex and secondarily on the medulla. An absolute state of anæmia of the medulla would insure certain death from suspension of respiration. It is highly probable that ether acts differently on the brain; that it produces a state of venous congestion similar to that of alcohol, when taken internally.

The positive and unmistakable evidence in both of these cases goes to establish the fact that the anæsthetic action of chloroform on the human brain and cerebral anæmia are invariable accompaniments in the relation of cause and effect. It will be observed, in the two cases reported, that during the surgical operations performed, the first patient was subjected to the influence of chloroform four times and the other three times. At each administration, from the time that the anæsthetic influence began, the circulation in the brain began to diminish, the hemorrhage and pulsations to decrease, until, under full anæsthesia, complete anæmia ensued.

Effects of Alcoholic Stimulants on the Brain when under Chloroform Narcosis.—This would appear to be a favorable stage to allude to the results of observations on the action of stimulants on the human brain when under chloroform narcosis, as witnessed in the cases reported, as I had a favorable opportunity on these occasions to witness both the conduct of the brain under simple chloroform and under both chloroform and whiskey.

At one period during these tedious operations, both lasting an hour or more, the patient showed indications of failing respiration and cardiac action, when it became necessary to resort to stimulants. Both patients were in a profound state of narcosis, and consequently they could not be given by the mouth, and at that time the hypodermic syringe was unknown, hence they were given per rectum. The indications during this profound state of narcosis were almost entire suspension of cerebral pulsations, extreme pallor of the brain, entire cessation of hemorrhage, slow, shallow respiration, and feeble pulse. In the case of the boy, an ounce of diluted whiskey was injected into

the rectum. In fifteen minutes the brain began to respond, feeble pulsations beginning, slight return of hemorrhage, and then the circulation in the brain became more active and the organ lost its extreme pallor, the respiration was regular and deeper, the pulse fuller, more regular, and stronger, until there were assurances of reaction, when the operation was continued. In this case there was no necessity of resorting again to the use of stimulants.

In the case of the wounded soldier, there were two occasions of rather alarming depression from chloroform narcosis during the operation, which lasted an hour and a quarter, when it became necessary to resort to stimulation.

The hemorrhage in this case, while the patient was under the profound influence of chloroform, was observed to suddenly cease, the brain to become pallid, the pulsations to be almost entirely suspended, the respiration to be very feeble, slow, and shallow, and the heart to show indications of failure. 2 ounces of diluted whiskey were promptly injected into the rectum. In fifteen or twenty minutes the heart began to respond, the respiration to improve, the hemorrhage from the brain to return, and the complexion of the organ to become more florid, and then renewal of pulsation. I am satisfied that in each of these instances of threatened collapse the primary action of the alcohol was on the heart. Previous to a return of blood to the brain, of hemorrhage, of pulsation, or of increase of respiratory action there was increased action of the heart, the pulse becoming fuller, stronger, and more regular. Relative to the action of alcohol on a patient when under the influence of chloroform, and more especially on the functions of the brain under these circumstances, the results of the administration of stimulants in these two cases, while in a state of chloroform narcosis bordering on collapse, indicate, in a manner beyond a doubt, that stimulants given in this condition exert a powerful, exciting, and energizing effect, first on the heart, then on the circulation in the brain and medulla, and as soon as the medulla —the centre of respiration—is touched by the alcoholic stimulant, the function of respiration begins also to respond.

In the process of restoration from chloroform-poisoning, when stimulants are resorted to, that their primary action is on the heart before the stimulating influence reaches the brain I have not only the facts in these two cases to show, but also facts derived from cases of true chloroform collapse.

In a case of this kind, of a female who secluded herself in a room and began inhaling from a six-ounce bottle of chloroform, to relieve neuralgia, she was found in a profound state of collapse, the bottle turned upside down, the bedding saturated, the pulse and respiration had ceased, the sounds of the heart absent, the pupils dilated, temperature 95° F. In the process of resuscitation, 4 ounces of whiskey were injected hypodermically, the head was lowered below the level of the body, nearly a half-grain of strychnine in all was also injected, and artificial respiration resorted to. But the first to respond to these powerful stimulants was the heart, then the respiration, then, in turn, the function of sensation to the hypodermic needle, and, lastly, consciousness.

The result of personal experience in the use of stimulants in chloroform narcosis, I think, will bear me out in the assertion that the combined action of alcohol and strychnine is better than either alone. A large quantity of whiskey given in chloroform collapse possibly might tend to increase the relaxation of the heart; but when given in connection with strychnine, this tendency is corrected. I feel satisfied that when stimulants are given, either before or during chloroform narcosis, they should always be given in connection with strychnine, as this combination affords the most potent excitants of the centres of respiration, circulation, and consciousness that we possess.

In regard to the propriety and advantage of resorting to stimulants in chloroform-poisoning, the evidences elicited in the two original cases reported would seem to establish the fact that they act as potent energizers of the centres of respiration, circulation, and consciousness.

Cerebral Anæmia caused by the Action of Chloroform in its Relations to the Functions of Respiration, Circulation, and Heat Generation. —The diverse influence exerted by the opposite conditions cerebral anæmia and cerebral plethora on the functions of respiration, circulation, and heat generation were among the most interesting phenomena witnessed in the history of the two cases cited. While under chloroform, as the cerebral anæmia increased, there was observed a simultaneous decline in the functions of respiration, of circulation, and then in heat generation, and this decline steadily progressed until the anæsthesia was complete and cerebral anæmia reached its lowest stage, or, in other words, until the reduction of circulation of the brain was lowered to a point where all hemorrhage ceased, the brain had lost its florid complexion and had assumed a pallid hue, and nearly all pulsation had been suspended. When the cerebral anæmia had

reached this point, the respiration was manifestly reduced in frequency and force, the cardiac action became slow, arterial tension markedly reduced, and correspondingly there was reduction of heat generation. On the contrary, as this cerebral anæmia passed off when the anæsthetic was suspended, there was return in force and depth of respiration, in arterial tension, and in cardiac force and heat generation.

The action of chloroform on the human system must be regarded in the light of a complex action, and not, as too many regard it, as a simple one. Cerebral anæmia and abolition of the faculty of consciousness and the function of sensation absolutely go hand in hand; they begin, progress, and terminate simultaneously. Then, when anæsthesia is pushed still further, anæmia of the medulla and spinal cord commences, and, as it progresses, the vital functions of respiration, reflex action, circulation, and heat generation succumb, until, when the anæmic condition of the brain reaches a point where there is not sufficient arterial blood furnished the brain and medulla to sustain vital action, then the respiratory centre begins first to indicate signs of failure; then follows paresis of the vaso-motor or circulatory centres, and, finally, all reflex action.

It would appear that in this process of suspension of the vital functions from chloroform narcosis the various centres succumb in the following order: first, consciousness and sensation; the next in order is that of respiration; then circulation; lastly, the entire functions of the spinal cord and reflex action. When the action of chloroform is confined to the brain alone, it may be in a state of profound narcosis for hours, with impunity, provided anæsthesia goes no further; but we must not encroach upon the medulla to any serious extent, or we promptly suspend respiration. We can, with impunity, continue a state of anæmia of the cortex of the brain, the centre of consciousness, for a considerable length of time, wherein the circulation of the brain is reduced from twenty-five to thirty per cent. We often see this state of affairs exemplified in cases of syncope, which is a harmless condition; but we cannot carry chloroform narcosis to that point, when the circulation in the medulla and the vaso-motor centres is diminished thirty or forty per cent., without producing paresis of those organs and suspension of their functions.

In regard to the quantity of chloroform required to reduce the circulation of the brain to a point compatible with the anæsthetic state, there is a marked difference in different individuals. In the first case reported, that of the boy of nineteen, 1 drachm of the chloroform and ether mixture produced profound anæsthesia; while in the second case, that of the adult, it required 3 or 4 drachms to produce a state of anæmia of the brain and unconsciousness. The less difficult it was to effect this anæmic state of the cerebral circulation the more readily was anæsthesia accomplished. On the contrary, when the circulation of the brain was excited by any cause whatever, and its action and arterial tension elevated from mental excitement, from muscular exertion, as violent struggling or resistance, it required a much larger quantity of the anæsthetic and a longer time to induce cerebral anæmia, and consequently anæsthesia. In both of these cases reported it may be stated as a fact based on incontestable evidence, that in no instance, in all these administrations of chloroform, was the patient brought to a state of anæsthesia without the preliminary cerebral anæmia, and in no case could anæsthesia be effected while the circulation of the brain was active and vigorous.

The Safety of Anæsthesia in Operations for Injuries of the Cranium and Brain.—There is a certain class of injuries of the cranium and brain where it may become necessary to resort to anæsthesia, either to control the patient or to save him from unnecessary suffering. Probably the great majority of such patients do not require it because they are already in a state of coma; then it can apply only to that class in which consciousness is either wholly or partially retained.

We have seen that the action of chloroform on the brain is to reduce its circulation from twenty to thirty per cent. and to arrest cerebral hemorrhage. These facts are to constitute our guide in the application of the agent in any given case. In our operations in such cases it is desirable to produce unconsciousness and insensibility, and at the same time to reduce the momentum and quantity of the cerebral circulation and to arrest excessive hemorrhage without impairing respiration. For instance, in cases of injury of the brain where the patient, though in a state of semi-consciousness, is restless, struggles against all interference, and resists treatment; in cases of delirium or great mental or nervous excitement; and when the hemorrhage is copious, even though in a semi-comatose state, chloroform is admissible. It not only quiets nervous excitement, but reduces cerebral congestion and engorgement and saves the loss of blood. On the contrary, in cases of injury of the brain or of

other portions of the body, accompanied with excessive shock and depression of the circulation and reduction of blood-supply, the brain is already in a state of anæmia, and to reduce its circulation still further would be, in all probability, to destroy the life of the patient.

Suppose, for instance, a case of this kind. We are called to operate upon a patient who has received a severe injury and is laboring under a tremendous shock, and the blood-supply to his brain, from shock or hemorrhage, has been reduced forty or fifty per cent. Would it be justifiable under such circumstances to give an agent, as chloroform, which will reduce the cerebral circulation at least twenty per cent. more? Yet this very result does actually occur when we give chloroform, when the circulation of the brain is reduced forty or fifty per cent. from shock or hemorrhage. We can calculate very accurately—I may say to a certainty—that chloroform is capable of reducing the cerebral circulation from thirty to forty per cent., and possibly more; hence we have in this fact a valuable guide in giving chloroform in shock. If we could all have the rare opportunity of observing a human brain exposed through a large open window in the skull, with every action and every change in its circulation and rhythmic movements exposed to view, we could see, under the action of chloroform, the pulsations of the organ grow fainter and fainter and more and more feeble, until they were reduced to a mere tremor, and finally ceased almost entirely. In the mean time the surface of the organ is losing the turgid, florid appearance, is growing paler and paler, and actually appears to diminish in volume. We know by these indications that the volume of blood circulating in the brain has been reduced to the border lines of danger; and it can be stated with certainty that in every case where anæsthesia from chloroform is produced, these wonderful and interesting changes are in actual progress in the brain. In my personal observations of the action of chloroform in these cases on the functions of the brain, I found a remarkable correspondence between that ashy pallor of the lips and prolabia peculiar as an initiatory symptom of chloroform collapse and that same corresponding ashy pallor of the surface of the brain from the same cause. In threatened collapse, deadly pallor of the brain appeared invariably in unison with an ashy hue of the lips; these peculiar indications appeared in both cases. Thus, in the peculiar extreme deadly pallor of the lips and prolabia we have a very correct and certain index of the true condition of the cerebral circulation.

Relationship of the Degree of Arterial Tension in the Pulse and Brain to the Respiratory Capacity.—In a state of anæsthesia in all cases there is diminution of a certain per cent. in the capacity of the lungs for inhalation. Probably in a slight degree the respiratory centre is affected in all cases of profound anæsthesia, and the capacity of the lungs for inhalation reduced in corresponding degree. Probably five or ten per cent. less of air is inhaled in every case of anæsthesia, but when it reaches twenty or thirty per cent., then we are approaching a state of asphyxia. During the operation in the second case reported, there were two occasions in which respiratory failure was threatened, and on both of these occasions there was marked decline in the arterial tension in the brain and pulse, and when the lungs were tested by auscultation, it was found that atmospheric air did not reach the bases at all, causing a probable reduction in inhalation of twenty per cent. On the contrary, when the arterial tension in the pulse and brain was restored, the respiratory capacity increased to within ninety-five per cent. of the normal. As observed in this case, the rise and fall of arterial tension in the pulse and brain and the respiratory capacity correspond in precise ratio. These facts would go to indicate that accurate and perfect consonance of action of the respiratory and circulatory centres exist in chloroform narcosis.

In the decline and failure of arterial tension in the brain and pulse there invariably is associated with the condition *shallowness* of respiration, so much and so justly dreaded by all surgeons and anæsthetists. The diaphragm acts irregularly and spasmodically, and the noise made by the effort at inhalation somewhat resembles hiccough, while the intercostals do not elevate the ribs sufficiently to expand the chest to the entrance of air. The respiratory and circulatory centres are so intimately associated and so thoroughly cooperative in their action that one of these vital functions cannot be seriously impaired without affecting the other. A sudden and decided reduction in arterial tension cannot occur without reducing in corresponding degree the respiratory capacity. Neither can the respiratory capacity be reduced to any serious extent without affecting arterial tension. I saw this peculiar phenomenon most clearly illustrated in the second case. If we desire to prevent untoward results in the administration of chloroform, we must watch with unrelenting vigilance the state of the two great vital functions,—circulation and respiration; and in case of collapse, devote our attention assiduously,

not to one alone of the functions, but to both equally. A revival of arterial tension in the pulse indicates its revival in the brain, and a revival of respiratory action is almost certain to be followed by a restoration of arterial tension. When we have secured a state of unconsciousness and insensibility, we have an infallible indication that the arterial tension of the brain is reduced to the point of safety. When we carry it still further and reduce the inspiratory capacity of the chest or act of respiration to two-thirds of the normal standard, we have an equally infallible sign that the arterial tension and circulation of the medulla are being reduced to a state of anæmia dangerous to life. But this wonderful property of chloroform to reduce arterial tension and circulation in the brain and spinal cord gives to it a decided advantage as a remedy in congestions and convulsive diseases of these organs.

The Action of Chloroform in Active Congestions and Engorgements, Violent Convulsive Movements, and Maniacal Excitement of the Brain.—I trust that I have been enabled to show you the wonderful power of chloroform to reduce not only arterial tension in the brain, but its power to actually reduce the circulating volume of blood in that organ; this must be regarded as a most important fact. We all know and appreciate the power of chloroform in violent convulsive affections with high arterial tension and an abnormal amount of blood in the brain. Nothing that we possess is capable of reducing arterial tension and cerebral congestion so speedily and easily; and I am impressed with the belief that in those cases of violent convulsive movement, maniacal excitement, high arterial excitement, and congestion there is no remedy whose action we can gauge so accurately as chloroform. If we find that the tension of the pulse is reduced thirty per cent., we may be certain that there has been a reduction in the arterial tension and circulation of the brain to that extent.

Many years ago, in a remarkable case of cerebral hemorrhage in the left hemisphere of the brain, resulting in paralysis of the opposite side, congestion, and finally inflammation of that hemisphere, with great restlessness and maniacal excitement, there was a high degree of arterial tension. But one of the most peculiar features of the case was an incessant involuntary rotary motion of the left arm that could not be controlled by the combined exertions of three or four men. In thirty minutes' time the free administration of chloroform would reduce this arterial tension fifty per cent., would arrest this rotary motion of the arm, and produce quiet sleep, indicating an equal reduction of arterial tension and circulation in the brain, and invariably after recovery from the effects of chloroform the patient would become more conscious, though he ultimately died of inflammatory softening.

It is thus clearly to be seen that in those cases of active delirium, maniacal excitement, or convulsive movement attending injuries of the brain, accompanied with a high arterial tension, symptoms of congestion, and even inflammatory action, when such a pathological combination does occur, it is not only no bar to the administration of chloroform, but is a condition actually favorable to its action. In congestion of the brain, whether traumatic or idiopathic, if coma is absent, if sensation is present, even if the patient is in a semi-conscious state, with active congestion, if necessary, chloroform is entirely admissible, as it will accomplish what depletion cannot do, and that is, to reduce the circulation of the brain.

Comparative Action of Chloroform and Ether on the Human Brain.—I think that there can be no doubt that the action of chloroform on the circulation of the brain differs materially from that of ether; that the one causes a state of positive reduction and consequent anæmia, and the other not only does not diminish the cerebral circulation, but, on the contrary, rather produces a venous plethora of the organ. From the effects of ether we never have that marked reduction in the arterial tension, that pallor of countenance, and ashy color of the lips that we find in the anæsthesia of chloroform. On the contrary, under the influence of ether, we often find the face deeply congested. While it is true that I have not seen a brain exposed under the action of ether, as in the case of chloroform, yet all who habitually administer ether are aware of the fact that under its influence marked reduction of arterial tension is not a usual result. I believe that in this difference of physiological action of the two remedies lies the safety of ether over chloroform, that ether rarely, if ever, causes a dangerous degree of reduction of circulation in the brain and medulla. In cases attended with shock from injury, imperfect reaction, or great physical prostration, either from disease, or from constitutional or temporary causes, where a surgical operation becomes necessary and it becomes our duty to elect between the anæsthetic to be selected, I think the facts established by the history of the two cases reported would indicate clearly that under such circumstances ether is the appropriate anæsthetic. When the circulatory tension, whether general or cerebral,

is low, I would hesitate in the use of chloroform. On the contrary, when the cerebral circulation is good, when the circulatory tension is not below par, chloroform is not only safe, but free from some of the dangers of ether.

Chloroform, from the beginning of its true anæsthetic action, is a depressant of the circulatory tension of the brain, and continues to reduce arterial circulation in the brain until, when the agent is pushed to extremes, there is absolute collapse of cerebral circulation. On the contrary, the primary effect of ether on the circulation of the brain is that of a direct stimulant, which finally results, when profound anæsthesia takes place, in a state of partial venous congestion of that organ similar to a state of profound alcoholism.

In using ether alone we do not hazard that extreme and dangerous reduction of the circulation of the brain and consequent anæmia that follows the indiscreet and careless use of chloroform as an anæsthetic.

If the conclusions arrived at from my observations on the action of chloroform on the human brain in the two cases reported be correct, and there can be no doubt of the facts elicited in these cases, then these facts go to prove that one of the chief, if not the chief, dangers in the use of chloroform is extreme reduction in the circulation of the brain and medulla, and also that the susceptibility to the influence of this remedy differs widely in different individuals,—so widely, indeed, that we cannot, without experiment in any given case, determine the degree of susceptibility. And, furthermore, that the only true security in administering this agent consists in giving it in drop doses on a small pervious mask held over the nose and mouth, admitting sufficient atmospheric air for respiratory purposes.

In conclusion, I desire to state that after my first experience with my original case of injury of the brain in which chloroform was used, and its history in condensed form was published in the October number of the *American Journal of the Medical Sciences* in the year 1860, I was so much impressed with the importance of the facts elicited by the action of chloroform in that case that I was induced to collect all available information pertaining to this subject, with the view of preparing for publication at some future time a more elaborate paper on the action of chloroform on the human brain. The second case of injury of the brain which was adapted to the application of chloroform occurred in the year 1862, and has never been heretofore reported. This case, very fortunately, afforded me another and even better opportunity to test the effects of chloroform on the brain than the first.

While hoping to have other cases of the kind to add to the strength and interest of my report, none others of a similar kind and character to which chloroform was applicable have so far come under my observation. Of the two cases reported, very complete notes were taken soon after their occurrence, and these notes constitute the groundwork of the present paper.

THE TREATMENT OF DIPHTHERIA.

By John L. Heffron, A.M., M.D.,
Professor of Therapeutics and Clinical Medicine, College of Medicine, Syracuse University.

IN discussing the treatment of any disease so well known as diphtheria, we are compelled at the very outset to choose one of two courses: to survey the entire field and pass in review all the remedies and methods that have been used and commended by therapeutists the world over, or to confine the discussion to the closer inspection of those remedies and those methods which clinical experience and laboratory demonstrations have proved to be of the greatest value and most frequently curative.

In no disease is the necessity for prompt, intelligent, and effective treatment more urgent. Every physician should have a clearly defined line of treatment organized in his brain, so that he can carry it out without hesitation or doubt and with effective energy. Accordingly, in this paper no mention will be made of the various treatments proposed that have not been thoroughly tried and found acceptable by American physicians, and attention will be concentrated to the consideration of those remedies that have stood the test of time and that are still dominant.

To conform to its pathology, the treatment of diphtheria is both local and constitutional; but, before entering upon the consideration of the local and constitutional treatment, it is desirable to refer briefly to the prophylaxis. The method of the dissemination of diphtheria is so accurately known that there can be but little excuse, when once a diagnosis is made, for further infection from any individual case. The isolation of the patient in a room prepared for his reception is imperative. Such a room should be commodious, free from all hangings and upholstered furniture, pictures, and bric-a-brac; the floor should be bare, or the carpet should be completely covered with crash. The bed should be simply furnished with covers that can be washed, and these should be changed at

least once daily. The nurse should wear a cotton gown, and a cap that completely covers her hair, whether it ornaments her head or not. The discharges from the affected membranes should be received into sanitary cuspidors or old cloths that should be immediately burnt up. In the use of any application directed to the throat, the nurse should stand at one side, or screen herself behind a piece of glass, as do laryngologists in treating a syphilitic throat. She should disinfect her hands after each contact with the patient. The air of the room should be kept moist by steam, so that the secretions cannot dry and, becoming pulverized, float in the air of the room.

Except in epidemics or in hospital practice, the careful physician will not need the protection of gown and hood, as sometimes recommended. In poor practice where proper care cannot be had, he cannot take too great precaution, and should protect himself and his family and his general clientage by every means known to art. He should disinfect all exposed parts of his body, including hair and beard, by thorough washing with sublimate solution, and should not enter any unaffected house before making a complete change of clothing. After the disease is over, or the absence of the Klebs-Loeffler bacillus has been demonstrated by cultures, the patient should be thoroughly disinfected and returned to the family.

For general prophylaxis, all children with a sore throat of any description should be excluded from school and from our houses until they can bring a clean bill of health from a physician of recognized ability. Kissing on the lips should not be allowed, as is so common among children and women. The use of public drinking-vessels should be prohibited. The proper treatment of nasal and pharyngeal catarrhs is an important matter. It is a possibility to inaugurate and keep up an efficient cleansing of the mucous membranes of nose and throat that is so nearly pleasant that a child with a catarrhal inheritance will submit to its daily use as gracefully as he does to the universally employed tooth-wash.

Recognizing the tonsils, including Luschka's, as vestigial structures, which in man subserve no useful purpose, and that an enlarged tonsil is always a source of danger, I unhesitatingly advise their prompt removal in all cases where they are diseased or project into the fauces.

The local treatment has for its objects the destruction or limitation of the growth of the specific pathogenic bacilli and the frequent removal of the poisonous ptomaines produced in the process of their rapid development.

This is accomplished by the frequent irrigation of the affected mucous membranes with solutions of agents that are germicidal, but not irritating and not poisonous to the patient, and by the destruction of the pseudo-membrane by digestive substances. In the application of these remedies, it is unanimously conceded by American physicians that any method that forcibly removes the membranes and does damage to the inflamed tissues is to be condemned as worse than useless; for, however active the agent used on the swab may be, the possibility of ptomaine absorption from the denuded and lacerated submucous tissues is so greatly increased as to more than overbalance any benefit that could accrue. Any method of the employment of an antiseptic agent that necessitates a hand-to-hand combat with the child is also to be most heavily condemned, because of the excessive strain thus thrown upon an already weakened heart. More than one child in the last stages of diphtheria has suddenly died in the midst of a struggle with its nurse, and *because* of such struggle. By the aid of a nasal syringe or a good atomizer and an effective remedy that is not disgustingly nauseating, such scenes can be avoided and a large number of patients saved. Personally, I do not consider the choice of a *particular* germicide of the first importance, but hold that a most effective local treatment can be carried out with any of the popular remedies, *provided* the irrigation is thorough and frequent. I much prefer half-hourly irrigation with a solution of boric acid in rose-water, that is accomplished without struggle and with regularity, than less frequent use of remedies more irritating, if not more effective.

Of the substances more recently come into prominence in the local treatment of diphtheria, peroxide of hydrogen stands first. It is a clear, transparent fluid without odor, and has the chemical formula of H_2O_2. Pure, it is a most violent escharotic, owing to the fact that in the presence of organic matter it is capable of liberating four hundred and seventy-five times its own volume of oxygen. The preparations ordinarily used are the ten- or fifteen-volume solutions,—*i.e.*, solutions capable of liberating ten or fifteen times their own volume of oxygen. There is no question but that it is capable of oxidizing pus and of killing the Klebs-Loeffler bacillus. It has one great disadvantage. In order to hold the extra molecule of oxygen in combination, all makers have been compelled to use nitric acid in the solution. This acidity is manifest in every specimen which I have examined. It is a variable quantity, but suffi-

ciently marked in every specimen to impart to it irritating qualities, not due to the strength of the solution, which, independently of the diphtheritic process, is sufficient, if persistently and frequently used for a day, to cause a thin pseudo-membranous deposit over the mucous surfaces with which it is brought in contact. Dr. Squibb has demonstrated that if this acidity be neutralized, at the moment of its use, by the addition of a little of a ten-per-cent. solution of soda, the efficacy of the peroxide is not diminished, and it can then be used with perfect freedom. This irritating quality of the commerical peroxide of hydrogen has been productive of so much harm that many physicians, including Jacobi, have inveighed against it. I am told that the product sold by a French firm is neutral to test-papers, and should not, therefore, be so injurious; but I cannot speak from personal knowledge. In "pyrozone," a liquid with a trade-mark attachment, the manufacturers claim to have a peroxide of hydrogen made without pressure and without acid, essentially permanent under ordinary conditions. It is sold in ground-glass-stoppered bottles, in three-per cent. solution, for internal use, or in sealed glass tubes, five per cent. or twenty-five per cent., for surgical purposes. The three-per-cent. solution is not neutral, and is quite irritating to my own throat. In using peroxide of hydrogen it is observed that rapid oxidation of the pseudo-membranes and the accompanying secretion takes place, which is indicated by the accumulation of bubbles of gas, and the expectorations are foamy. After an application nearly an hour must elapse before the improved condition can be clearly seen. If the membrane be thin, the fifteen-volume solution can be diluted with ten times its bulk of water, and the solution applied by means of an atomizer; or it can be diluted with fifteen volumes of water and introduced through the nose by a syringe. If the membrane in the fauces is dense, a glass syringe is used and the fine point made to penetrate the membrane, and a few drops of a strong solution is introduced under the membrane. The repetition of this every second hour results in the disintegration of the membrane in a short time.

Carbolic acid in one-per-cent. solution, alone or combined with alkalies and borax, has long been a favorite, and of its usefulness there is little question.

The bichloride of mercury with citric acid, in 1 to 1000 or 1 to 2000 solution, is effective, not disagreeable, and (if not used in concentrated solution) not irritating, and it is not toxic except in those especially susceptible to the action of mercury. The same can be said of the biniodide of mercury in solution of proper strength, say 1 to 10,000, or even 1 to 20,000. Where children are old enough to gargle and intelligent enough to eject the solution, there is no more effective medication than that afforded by corrosive sublimate or by carbolic acid. In very young children neither should be used, because of the danger from systemic poisoning. At the earnest solicitation of a patient for whom I had prescribed a gargle of permanganate of potassium, I made a personal trial of the solution. I have never prescribed it since, and I am glad to know that it is no longer mentioned as a remedy of power in the treatment of this or any other throat-disease.

Salicylic acid in various solutions has been used, but it offers no superiority to other substances more agreeable.

Boric acid in saturated solution, fifteen grains to the ounce, is capable of greatly modifying the development of the specific bacilli, though it is not so quickly destructive of their energy. Its freedom from odor, from taste, and from colors makes it a favorite remedy with very many physicians. It is so little irritating that it can be used freely through the nose as well as the fauces, and because of this property is especially adapted for use by those who believe in the frequent flooding of the mucous membranes of the nose and fauces as a matter of routine practice. I am quite sure that I have seen far better results by this method of procedure,—injecting a drachm of a four-per-cent. solution of boric acid in rose-water through each nostril every half-hour, day and night,—with the peaceful co-operation of the patient, than I have from the use of other solutions, more powerful but more disagreeable, forced upon an unwilling child.

The vegetable acids—acetic, citric, and malic—are of undoubted service in the treatment of diphtheria. The pineapple contains much malic acid and a peculiar substance claimed to have solvent power on fibrin. However that may be, the use of pineapple syrup or of lemon-juice and sugar, as a vehicle for the medicine to be given internally, will be appreciated by every child, and the selection of Rhine wine as a favorite alcoholic will permit of the addition of vegetable acids as allies in our treatment which are not to be neglected.

Within a comparatively recent period the use of digestive ferments to destroy the diphtheritic membrane has been extensively practised. This use is scientific. The digestion of the membranes does not cure the diphtheria, but it exposes the germs to the action of whatever germicide may be immediately afterwards

used, and, equally important, makes it possible to wash away their deadly product before it becomes absorbed. Pepsin was early used, but because it was less active in alkaline fluids, it was supplanted by trypsin, which, again, has the disadvantage of being active only in an alkaline medium. Either can be used in concentrated solutions or as a glycerole, or the powder can be blown directly upon the membrane. Better than either pepsin or trypsin, because it is equally active in alkaline and acid media, and because its action is augmented rather than destroyed by the ordinary solutions of the various germicides, is the vegetable pepsin extracted from the melon-like fruit of the paw-paw tree. A friend tells me that in Florida, where the native beef is the toughest ever known to man, the Crackers have learned that the meat can be made tender by wrapping it in the leaves of the paw-paw, and the most refractory specimen yields to a night's action of the cut slices of this marvellous melon. I have often demonstrated its solvent powers upon fibrins, and have made use of it in solution with an atomizer, but quickly discovered that a watery solution underwent decomposition very rapidly, and inside of a very few hours developed an odor that rivalled that of some of the so-called pure pepsins. Accordingly I began using it as a powder, blowing it upon the affected surfaces, or sometimes as a thick paste, carefully painting it over the fauces. By recent investigations by Professor Chittenden, M.D., of Yale, it has been definitely established that a solution of papoid can be made permanent by the addition of boric acid or salicylic acid or bichloride of mercury, and that these substances, instead of interfering with the activity of papoid, actually increase its solvent powers, so that an application can be made that is at once solvent and germicidal.

If the diphtheria becomes laryngeal, local medication must then be carried out by means of medicated steam or by volatilized or sublimed drugs. Indeed, it has become habitual with me in every case of diphtheria, except of a very light grade, to order water evaporated in a shallow vessel over an alcohol or oil lamp, so that the air of the room shall be constantly charged with moisture, and to direct that into the water, from time to time, shall be put a tablespoonful of a mixture containing half an ounce each of pure carbolic acid or wood creosote and oil of eucalyptus and six ounces of spirits of turpentine. It seems to me reasonable to think that an atmosphere charged with these volatilized drugs, which are known to be valuable antiseptics and stimulants to the respiratory mucous membrane, should prevent the invasion of the larynx and trachea. It is in evidence that in cases where it has been early and persistently used complete obstruction has not occurred, and in cases of great malignancy and rapidity, where tracheotomy was early necessary, the constant use of this steam and the occasional spray of lime-water increased the percentage of recoveries. Lime-water is chemically a solvent of the pseudo-membrane; it is also possessed of marked antiseptic properties; it is astringent and very soothing to an irritated mucous membrane. Sprays of finely atomized warm lime-water should be frequently, almost constantly, employed in diphtheritic croup. It does not answer to slake lime for the accomplishment of this purpose, though in an emergency the slaking of stone lime gives large volumes of steam, which of itself is a gain. But steam can be generated so easily by dipping heated irons into water, or by rigging up a steam generator that can communicate with a tent-covered bed, that the crude method of obtaining that result with slaking lime is rarely resorted to.

The sublimation of calomel is highly recommended in laryngeal diphtheria. In a recent discussion to which I had the pleasure of listening, Dr. J. Lewis Smith said that this method had cured cases of laryngeal croup in which it seemed that an operation must be necessary, and he further asserted that O'Dwyer and others of wide experience say that in cases where operations have been necessary, the recovery has been more prompt and more satisfactory under the influence of this drug. The sublimation is accomplished by placing on a tin plate over an alcohol lamp fifteen grains of calomel, and confining the dense white fumes resulting inside of a tent. It is asserted that no case of systemic poisoning has occurred in a patient, though nurse and physician have sometimes become salivated. I have used a modification of this method, and have observed that while the fumes were very irritating to the attendants, the patient was unaffected, and indeed apparently enjoyed the procedure.

To summarize the local treatment that to-day seems the most effective, we would include the early and constant use of steam medicated with the turpentine mixture; the cleansing of the fauces with a solution of papoid, followed by frequent irrigations day and night with bichloride solution or boric acid or Dobell's solution, properly administered through a blunt-pointed nasal syringe; the sublimation of calomel as soon as the larynx shows evidence of invasion the choice of vehicles containing fruit acids in

the administration of medicine, and of a sour wine as an alcoholic. We have no specific for diphtheria.

The indications for the constitutional treatment are three,—*to support the system, to antagonize the ptomaines, and to support the heart.* For the fulfilment of the first indication food is of the first importance, and any medical treatment that interferes with the ability to take and assimilate a full allowance of nutriment is worse than useless. The food should be easy to digest, bland, and for the most part fluid in form; and for this purpose milk and beef-juice answer admirably, though other suitable things may be allowed, like oysters, fresh eggs, oatmeal gruel, and the various invalid foods, especially those partly digested. It should be given every three hours, day and night.

The experience of the past has taught us that in the tincture of the chloride of iron we have a remedy of absolute value, and that the combination with it of chlorate of potassium in small doses enhances its value and does not endanger the kidneys. A mixture containing these agencies in a fruit syrup, like pineapple syrup, is readily taken, and to be effective must be frequently given and in such doses as the general condition of the patient makes necessary. The chlorate of potassium has no specific effect upon the diphtheritic process, but it stimulates the non-infected membrane to healthful activity, and aids materially in preventing the spread of the disease.

The bichloride of mercury in small doses frequently given has been used sufficiently long to have gained a place in the list of effective remedies. It is my practice to give $\frac{1}{500}$ grain of bichloride of mercury, sufficiently diluted, every half-hour, day and night, and I have yet to see any but beneficial effects from this employment of the drug. It supports the system, stimulates the appetite, and prevents fermentation of food, and has some antiseptic action locally as it is swallowed.

Small doses of quinine are sometimes of use, but, in my experience, the early and persistent use of therapeutic doses of strychnine sulphate or nitrate accomplishes much more; for, while it is a stomachic and stimulates digestion, it is the best possible stimulant to cardiac and respiratory centres, and antagonizes the baneful effects of the ptomaines upon the nervous system as but one other drug in the materia medica does.

The use of alcohol is indicated in nearly every case. Under the influence of the ptomaines, it is astonishing what quantities of alcohol can be exhibited without producing characteristic effects. I hold with those who believe it demonstrated that alcohol, in cases of systemic poisoning, whether from snake-bites or ptomaine saturation, supports the system and antagonizes the alkaloidal poisons more efficiently than any other remedy we have. It should be given early, and unless there be some indications for some other form, the choice should be an old, sound Rhine wine. If the acid of this wine fails to agree with the stomach, a pure whiskey diluted with water should be selected. The dose depends only upon the necessities of the case; and yet it should not be forgotten that it is possible, even in diphtheria, to produce acute acoholic effects.

If, with these drugs properly administered, the heart shows signs of failure, resort must be had to musk and digitalis. In cases of systemic poisoning, as in typhoid fever or in diphtheria, musk has seemed to me to be more effective than digitalis or any other cardiac stimulant. Indeed, I have come to feel that if musk fails to stimulate the heart where an arrest of the circulation impends in this class of cases, medical art is of no more avail.

The use of pilocarpine has been advocated by eminent authority, but fears of its depressing effects upon the heart seem so well founded that it will be well to wait for others to prove its safety before we advocate its use.

The list of possible remedies is very long, its very length being a proof that we have no specific as yet against a disease that takes more lives annually than does the much-dreaded yellow fever or the cholera.

If time shall prove that in the recent discoveries in the bacteriological laboratories of Berlin a specific has at last been discovered that will not only render our children immune from this disease, if given as a prophylactic, but also cure them safely and quickly when attacked by this dreaded destroyer of life, we can look into the faces of our little ones with a feeling of safety that we do not now know.

Since the preparation of the above, Professor Loeffler's paper on "The Local Treatment of Pharyngeal Diphtheria," read at the last International Medical Congress, has been published in the *Deutsche Medicinische Wochenschrift* for October, 1894.

Recognizing the great advance made in the therapeutics of diphtheria by the discovery of antitoxin, he is still loath to forego the local use of disinfectants for the following reasons: first, because in a very long series of cases the local use of the remedy he has evolved from bacteriologi-

cal and clinical studies has proved of astonishingly great value; secondly, because true diphtheria is so often associated with other complicating pathological processes, the result of pus-producing cocci, none of which are favorably affected by antitoxin, but all of which are destroyed by his remedy; and, thirdly, because the remedy is inexpensive and always at hand.

Briefly stated, the remedy he has arrived at from years of bacteriological and clinical investigations is a combination of disinfectants stronger than any of its components, not at all injurious to the individual, though killing the Klebs-Loeffler bacillus,—the pseudo-bacillus and streptococci in five seconds, and the staphylococci in forty seconds *in situ* in the membranes and the secretions. It produces a sensation of burning, which passes off in a few minutes, and it is not disagreeable in taste or odor.

For the purpose of diminishing the disagreeable sensation at the seat of application, menthol has been added, and the completed formula is as follows:

℞ Menthol, 10.9 c.c.m.;
Solve in toluol, 36 c.c.m.;
Alcohol, absolute, ad 60 c.c.m.;
Liquor ferri sesquichlorat., 4 c.c.m. M.
Put in a brown glass bottle with a glass stopper.

The solution keeps for months without losing any of its efficacy; its application is simple. The diseased area is to be cleansed of mucus by wiping it with a pledget of absorbent cotton, and then a second pledget saturated with the solution is to be held against the spot for five to ten seconds. The application is to be repeated every three hours in the beginning, and less and less frequently as improvement is noted; and, finally, but once a day, to prevent the redevelopment of the disease from bacilli that may have been deeply lodged in the crypts of an irregular tonsil.

The results obtained in cases seen on the first day of the appearance of the disease have been uniformly and rapidly curative. There has been no extension of the process downward into the larynx or forward into the nose, and convalescence has not been attended by any of the paralyses.

In cases seen later the results compare favorably with those attained by the use of antitoxin at a similar period.

The effect is shown by a return of the temperature to the normal in from twenty-four to forty-eight hours, and a decrease in the frequency of the pulse, which, however, does not return to the normal standard until about two days after the temperature becomes normal. The improvement in the general condition is rapid and very marked. The membrane soon becomes changed in consistence, softening and shedding in large flakes in a comparatively short time.

In severe cases the mixture containing the iron solution is always to be chosen, but in cases where the patient is so sensitive as to be unable to bear the transitory smarting of the application, and in cases accompanied by putrefactive processes where the iron becomes changed into the sulphide, discoloring the pharynx and the tongue, and in all of the pseudo-diphtheritic diseases, he recommends that for the iron solution there be substituted two cubic centimetres of meta-cresol or two cubic centimetres of creolin, and the alcohol be increased by the same amount, and asserts that the efficacy of the solution is but little impaired, though it does not exert its influence so deeply.

Since reading this paper I have had but one opportunity to test the remedy. In this case the results tallied exactly with those detailed above.

448 South Salina Street,
November 13, 1894.

A PLEA FOR VENESECTION.

Read before the Gloucester County Medical Society at a Meeting held at Cape May, N. J., on July 6, 1894. Published by Request of the Society.

By George C. Laws, Ph.D., M.D., of Paulsboro, N. J.

IT is difficult to assign to any one cause the almost entire disuse of venesection. In the early part of this century it was the remedy, and was used indiscriminately. During the great epidemic of typhus fever that prevailed from 1812 to 1820, and for some time after, it was found that the epidemic had impressed some of its characteristics on all diseases, and that depletion was not well borne. The advent of homœopathy, "that remarkable system of doing nothing," demonstrated that it was possible for patients to recover without any medical treatment, except nursing and diet. About this time a reform was originated within the ranks of the profession against the indiscriminate use of cupping, bleeding, and leeching by barbers, unqualified persons, and the laity themselves, as well as in regular practice.

The influence of novelists and writers of from twenty-five to fifty years ago is not to be discounted. From the homœopathic era to the present time it has been the fashion to make sport of medical science and regular practitioners. Thus, among those most widely

read, Lord Lytton, in one of his stories, makes a reformed medical character regret the time when he practised manslaughter; Wilkie Collins demonstrates the superiority of a warm bath over medical treatment in recovering a man from apoplexy; Charles Reade, in almost all of his stories, has for a character the medical crank who sneers at regular practice, cures without medicine, and is vindictively strong against bleeding; George Eliot, in "Middlemarch," demonstrates the beauty of the "expectant treatment of pneumonia by diurnal applications of the clinical thermometer;" the story of the treatment of General Washington in his last sickness has been told over and over again; Dr. Sangrado, in "Gil Blas," with his bloodletting and warm-water diet, has been referred to as though he were a standard medical authority. These will serve as a few examples of the tone of the secular press. Even at the college, when I was a student, it was not unusual for some of the professors to give a sly dig at the practice.

The opposition to bleeding as a remedy came largely from without; what was intended as a reform of abuses within the profession became an almost total abandonment of one of the most powerful and beneficial therapeutic agents at our command. As a routine practice it may have been overdone at times, but its abandonment was uncalled for, and has cost thousands of valuable lives annually.

From reading many of the medical and other publications of a few years ago, we would imbibe the opinion that the people of the last century were habitually bled to the verge of death, and the human race must, in consequence, have been feeble and exsanguineous. The portraits of our grandparents and earlier ancestors show a different state of affairs. Portraits of the Revolutionary worthies in Independence Hall show a remarkably healthy and vigorous set of men; they do not look as though they suffered from organic weaknesses of any kind, or were troubled much with anæmia.

My medical experience began twenty-five years ago; at that time a reaction seemed to be setting in against the antivenesection fad. Professor Stillé advocated its use in his lectures as a powerful therapeutic agent, even recommending it in the early stages of typhoid fever; at the same time I think his list of contraindications had the effect of frightening his pupils; Professor Gross, of the Jefferson College, was also an able advocate of its utility. Dr. Hiram Corson, that thorough, all-around practitioner and typical country doctor, also urged by tongue and pen the importance of common-sense methods, bleeding included, in treating disease.

Dr. George B. Wood, the author of the "United States Dispensatory" and Wood's "Practice," was a firm believer in practical therapeutics, and urged the value of bleeding in inflammation and congestion. While this was the teaching of the time, yet the practical fact remains that from the time I entered the college until my fifth year of practice I was a strong antivenesectionist, and I have a suspicion that other practitioners were for the same reason,—viz., I had never seen a patient bled, and did not know how, except theoretically. I could have performed an amputation with a great deal more confidence. In these early days I encountered some cases of pneumonia and pulmonary congestion, as well as other congestive and inflammatory conditions; the supporting treatment was then in vogue; the human race was considered to be in a weak and tottering condition, requiring nourishing and stimulation when sick. A few cases of accidental hemorrhage occurring with beneficial results led me to a radical change in mode of treatment. My experience with pneumonia, apoplexy, and congestive and inflammatory conditions had not been entirely satisfactory. While most of the cases pulled through, still, there seemed in pneumonia to be impairment of lung-tissue; one or two slipped off easily into a typhoid condition instead of getting well, and a couple of cases that I thought were pneumonia in the outset might as well have been cases of acute phthisis for the deadly certainty with which their lung-tissue softened down.

My experience with a few cases may prove interesting; I select a few from a comparatively large number. These ones I took record of at the time. Almost my first patient from the dispensary was a case of pneumonia. He died promptly before I got in a second visit.

December 20, 1876.—W. M., aged forty-eight, farmer, after a drive from the city in a cold rain, was taken with a chill, fever, and all the symptoms of pneumonia of lower lobe of right lung. A laxative of rhubarb and calomel, followed by veratrum viride and gelsemium and quinine and milk-punch and hot poultices, were the orthodox remedies then. He lived some miles out in the country, and on the night of the 21st we had the bad storm of the season. About midnight he had a severe attack of bleeding from the nose. It was impossible to send for me on account of the storm, and as he felt the better for it, he let it bleed.

He saved the blood to show me in the morning; there was over a quart. There was some slight cough, but no pain, and he was able to take a full, deep inspiration; no pneumonia in sight.

The next case was Mabel J., aged twelve. Decided chill February 11, followed by fever and pain at the base of the right lung. February 12, pulse, 135; temperature, 104° F.; respiration, 28. Sharp, painful cough; expectoration raised with difficulty, rusty and bloody. Treatment, a laxative, followed by Norwood's tincture, 3 drops every hour, hot mush poultices to side, and a quieting cough mixture every two hours. February 13, ditto. February 14, had a sharp chill the night before, followed by additional pain in left side; pulse, 155; temperature, 105.5° F.; respiration, 40; cough and expectoration freer, with plenty of rusty sputa. Child delirious. At 10 A.M. I applied three leeches to base of left lung, checking what I considered superfluous bleeding, after leeches dropped off, with Monsel's salt. The leeches gave relief; reapplied the hot poultices, and continued treatment, with the addition of quinine and milk-punch, and went out into the country to a confinement. On my return home, at 8 P.M., found a message to come at once. Found patient very weak, face and lips as white as the pillow, pulse feeble, 80 per minute; temperature, 98° F.; respiration, 14. Found the poultices and the bedding under the child saturated with blood and the leech-bites each running a small stream. Monsel's salt on cotton and a strip of adhesive plaster stopped the bleeding. Wrapped chest in cotton; milk-punch and beef-tea, and quinine sufficient to prevent a return of chill next evening were required, but I do not remember to have seen anything further of the pneumonia. I invested in a lancet.

Christian W., aged twenty-two, a German, a stout, hearty man, had pneumonia of right lung. A physician from the city had seen and prescribed for him while attending another patient in the house. Had been sick three days when I saw him, and was then in a bad way. Temperature, 104.5° F.; pulse, 150; respiration, 38; rusty sputa. Sharp, painful cough, pain in right side, and dyspnœa. Next night, about midnight, was sent for in a hurry and found him much worse; face and extremities dark and livid; pulse small, feeble, and rapid; breathing rapid; patient semi-unconscious and apparently dying. I tied up his arm and bled him; I bled him until the lividity disappeared from the face and the duskiness from the skin; till his lips and finger-nails changed from black to their natural hue; till his pulse slowed down and increased in volume and strength; till he came out of his coma and could take a long, deep inspiration. Subsequent treatment, digitalis, carbonate of ammonium, milk-punch and quinine, and later on an expectorant mixture of squills, senega, and muriate of ammonium, with $\frac{1}{20}$ to $\frac{1}{14}$ grain of morphine in each dose. He was convalescent next day.

August 25, 1878.—Mrs. M., aged thirty-five, married; three children, youngest thirteen months old; not a robust woman, but still of fair health. The usual history of pneumonia of right lung. Taken sick Wednesday night with chill and fever, pain in side, dyspnœa, dry, painful cough, and later on rusty sputa. Saw her Thursday. Bled her moderately, about twelve ounces. (Her husband and all his family were strong sugarpaths.) Friday considerable better, apparently convalescing; a very warm night and the nurse raised all the windows; towards morning awakened out of sleep with a sharp chill, followed by fever, pain, and distress in left side and return of symptoms in right lung. I saw her Saturday morning. Temperature, 106° F.; pulse, 140 and weak; respiration, 50; face, neck, and extremities livid; cough sharp and distressing; rusty and bloody sputa. A 9 o'clock A.M. I succeeded in bleeding her about four fluid-ounces, with considerable relief. At ten o'clock I tied up the other arm and bled her all I could get,—about two pints that time. I left her about eleven o'clock feeling easy and comfortable and breathing easily. Pulse, 110° F.; temperature, 102; respiration, 20. At 1 P.M. was sent for again in a hurry; she was having considerable uterine flow, and in about an hour miscarried at the second month, with the usual hemorrhagic accompaniment. From all the loss of blood I never saw any bad results or any especial weakness. Uterine discharge kept up about as usual for a few days. We had no more pneumonia.

I remember another bad case of which I have no record, where I failed to draw blood with the lancet until I had applied wet cups to the chest and so relieved the circulation.

I have had numerous cases of pneumonia since, but have had none as bad as those in my early years of practice. In all cases I believe it is good practice to bleed promptly as soon as the disease is recognized. Even a mild case may become dangerous if the usual pathological changes take place in the lungs. I also believe it is never too late to bleed, if the patient

is alive. The amount of relief that follows the first successful touch of the lancet is so great that it has to be seen to be appreciated. It would be a waste of time for me to discuss the clinical history and pathology of pneumonia; with both you are all familiar, and also have adequate libraries for reference. But from the stand-point of an active practitioner there are a few points I would call your attention to: whenever a man dies, he dies either in the heart, the brain, or the lungs. In pneumonia the cause of death is in all three; there is the congested, engorged, and infiltrated lung substance, the exhausted and overloaded heart and venous system, the narcotized and congested brain. The blood, which ought to be the very well-spring of life, has become to all intents and purposes a foreign body. There may be such a being as the pneumonia microbe, but he is just as likely to be a *post hoc* as a *propter hoc*. If ever there was a mechanical disease it is this, and common sense points to the means of relief. Blood can be manufactured by the gallon, if required, for future use; but lung-substance may become permanently impaired in a short time, or become the seat of tuberculosis at a later stage.

The heart may have a thrombus formed, to become the immediate cause of death, or may become permanently crippled and weakened. There is but one safe rule with regard to the amount to be taken, and that is, without reference to quantity, to bleed until there is entire relief, if possible, and it is nearly always possible in the early stages. If, for any cause, bleeding is postponed till later, I think it good practice to not check the flow so long as there is improvement, and to stop at the first intimation of approaching faintness, which may always be told by the slight blanching of the lips. Watch the patient's face and pay no attention to the quantity of blood taken; how much a case of pneumonia has to spare no one will believe, except by actual experience. Pneumonia is counted as the sixth disease in fatality. Thousands die every week from diseases classed as pneumonia, pleurisy, congestion of lungs, acute bronchitis, etc., many of which might be promptly relieved if the physician would tie up an arm, tap a vein, and relieve the overcharged lungs, heart, and brain of their superfluity of blood. I have had no experience in bleeding young children, except by leeches; they seem to answer the purpose.

During the late epidemic of grippe a condition prevailed resembling pneumonia and yet seeming to be the exact opposite. There was cough, slight dyspnœa, rusty or rather plum-juice sputa, lividity of skin, and prostration, this state of affairs coming on slowly in the course of an attack of grippe, and being due to a weak heart and passive venous congestion. These cases yielded readily to stimulants and heart tonics,—whiskey, digitalis, strychnine, etc. In one of these cases, after convalescence, on exposure to cold, there was a sharp, decided chill, fever, and pneumonia of the regular type; patient had had valvular disease for several years, and was seventy years of age. Case ended fatally. I used leeches freely. I believe that in all cases of acute congestion or inflammatory disease the most prompt and efficacious remedy is bloodletting. In case of high fever, try the temperature before and after and be convinced.

In pneumonia do not wait until you find a so-called sthenic case with a strong heart and full, bounding pulse; if you do, you may wait forever; but place your finger on the weak, rapid pulse of pneumonia and observe it slow down and become stronger as the tension is relieved; see the dusky veil lifted from the face as if by magic; see the labored breathing become easy; watch the expression of unspeakable relief that steals over the countenance, and the next time you get a similar case go do it again.

Venesection is the most prompt and efficacious remedy at our command in all the acute inflammatory and congestive diseases; also in apoplexy, threatened and developed, puerperal and uræmic convulsions, for weak and irregular labor-pains in plethoric subjects, in threatened abortion, and as a means of relieving the distress and discomfort of pregnant women, due to plethora and general venous congestion. The operation is perfectly simple, and in the majority of cases you have no doubt of the certainty of the result. I have frequently used it in the above-mentioned diseases and conditions.

In ordinary cases of threatened abortion we often find the happiest results. The following case is extraordinary:

Mrs. W., aged thirty-two; married thirteen years and aborted thirteen times at all periods of gestation, generally between the fourth and the sixth months. Several of the children had been born alive and lived from a few minutes to twenty-four hours. She never went beyond the sixth month. There was no history of syphilis; no means used to cause miscarriage; antisyphilitic and all other treatment, under the best counsel I could get, were of no avail. She could tell forty-eight hours in advance that a miscarriage was going to occur by a feeling

of pain and weight across the loins and by a peculiar prickling and tingling sensation over a surface the size of the hand, which she described as within the womb.

January 10, 1887.—Is now three months pregnant. Notified her to send me word as soon as a miscarriage threatened. She sent for me February 6. I bled her freely. Sent for again March 3; bled her again. July 13, delivered her of a healthy child at full term; living now.

In 1890 she became pregnant again. Taken with the usual premonitory symptoms while away from home. July 2, miscarried at the fourth month.

In November, 1891, she became pregnant again. She sent for me and I bled her, at her request, on the following dates: February 8, March 1, April 2, May 4, May 18, June 2, June 24. August 31, delivered her at full term; a healthy child; weighed nine and a half pounds. Now living and healthy. She said that as she either had to be bled or have a miscarriage, she preferred the former.

In conclusion, permit me to quote the great and learned author of the "United States Dispensatory," Dr. George B. Wood. He says it is a fatal lesson to teach the inexperienced that we are to treat inflammation always as a friend and never as an enemy. "My own personal experience with venesection is certainly in its favor. Having been in my early professional life opposed to the excessive use of the lancet, then in vogue, I have no prejudices in favor of the remedy, and yet I can most conscientiously declare that I have almost never had occasion to regret using it in inflammation, but, on the contrary, have had frequent occasion to regret that it had not been used more freely. I know as positively as I can know anything from observation, that it is not only capable of relieving inflammation in the early stages, but will often cut it short and lead to prompt convalescence."

The rule is, I think, universal, that in all cases of inflammation so serious from degree or position as to involve life in danger, bleeding should be employed in the early stages, unless forbidden by general delibility or the low grade of the fever.

My dear medical brethren, these are times of therapeutic pessimism,—

> "When schizomicetes grin in glee,
> When microbes dig their holes,
> When germs feel free to split in three
> And exult in their septic souls."

When it is considered the mark of a weak intellect to believe that quinine and the salts of bark are antiperiodics; that there is any use in an emetic or cathartic; that there is such a thing as an expectorant, a diuretic, or a diaphoretic; when it is an unpardonable medical sin to give calomel to act on the liver; when iodides and bromides are prescribed by inhalation or absorption at the sea-side and iron from a spring in the mountains; when, if you are called to see a case of sickness, it is your first duty to examine the drain and prescribe accordingly for the drain; when great is sanitary science, and doctors who would prefer to be paid by the State, and who do not like the care of sick people, are its prophets; I have felt like lifting my voice and recording my testimony in favor of one of the old remedies and of the old way of using anything in heaven above or the earth beneath to help a sick man get well. That while hygiene and sanitation require part of our attention, still, our main duty will always be the care of the individual sick, the alleviation of suffering, and the saving of individual human lives; and that the neglect of all proper means for these ends, even though those means are not found in the therapeutics of the United States Dispensatory, will do more harm and cause more loss of life that can be saved by all the so-called sanitary science now in vogue.

THE PREPARATION OF SURGICAL CATGUT.

A Graduating Thesis to which was awarded the Dr. L. J. C. Kimmel Prizes, June, 1894.

By Arthur Woodward Booth, M.D.,
Resident Surgeon Howard Hospital, Philadelphia.

SURGICAL catgut, properly prepared for employment as a suture, ligature, or drain, deserves a place in the material equipment of the modern clean surgeon. Its non-use by many and limited use by all can be attributed in most part to its unreliability as regards,—

(*a*) Its tensile strength.

(*b*) Its freedom from septic infection.

(*c*) Its persistence in the tissues as a competent suture or ligature.

Theoretically, we have a twisted animal-tissue cord that is clean, strong, flexible, unirritating, and capable of absorption by the living body tissues.

In actual practice, we find it often septic, weak, yielding, sometimes brittle and totally unfit for surgical purposes.

This thesis is, therefore, written to ascertain if there be any absolutely reliable method of preparation to obviate these imperfections.

History.—The history of sutures and ligatures from the earliest times down to the present is an interesting one. Formerly, the universal custom of carrying sharp instruments of defence naturally resulted in a necessity for sewing up the flesh wounds. This may in part explain why the suture was known and used long before the ligature. In reviewing the history of the suture, we find that the early surgeons used them made of silk and vegetable fibre, such as hemp, linen, and cotton. Metallic wire was next employed in conjunction with the above. But not until the nineteenth century was animal tissue introduced, although we find some proof of its occasional employment by Rhazes, 900 A.D., and Albucasis about 1100 A.D.

Till the sixteenth century, the barbaric custom of checking hemorrhage by direct applications of boiling oil or red-hot iron was still in vogue; but in the latter half of this period Ambrose Paré suggested the humane and most natural method,—viz., that of tying the severed blood-vessels. Thus the ligature became known. However, Antyllus, in the fourth century, employed a ligature in his operation for aneurism, and there is evidence to show that the ligature was known by others before Paré, but had been forgotten; so Paré may be said to have rediscovered it. Nevertheless, the hot iron was still used by many as late as 1800 A.D.

Paré made ligatures of vegetable material and silk. It remained for Physick, in 1814, nearly two centuries later, to demonstrate the practical advantages of the animal ligature. He made ligatures of chamois leather, cut in narrow strips and rolled between marble slabs until round and smooth. Dorsey followed Physick's example. Sir Astley Cooper, in 1817, was the first to use violin strings, or "catgut," and through his success it was introduced into practice. Owing to the septic character of these animal ligatures, which were not prepared in accordance with the requirements of modern surgical cleanliness, their use was greatly diminished during the following years, until Sir Joseph Lister, in 1869, *very enthusiastically* advocated the use of the catgut strand, and taught the important lesson that catgut ought to be prepared before being buried in the tissues. His original method consisted of soaking the crude catgut in a five-per-cent. carbolic-glycerin solution. This is essentially his "old preparing liquid," and will be referred to later.

Various other animal tissues have from time to time been suggested and used as ligature material. Among these are kangaroo tendons, tendon of the dog's tail, tendon of the lepus, or mule-eared rabbit, sinews of the deer and whale, strips of the middle coat of ox aorta, sciatic nerve of the calf, horse-hair, etc.

Manufacture.—Why catgut is so named remains unexplainable. It might be suggested that surgeons, at first, used violin strings (and, in fact, some still purchase their supply from violin dealers). It is not unreasonable to believe that ancient string-makers employed the feline intestine. Tradition tells us that the choicest Roman strings came from the lions and tigers of the arena.

The etymology of the word casts some light upon the subject. Catgut is supposed to have been originally "kitgut" or "kitstring,"—"kit" meaning a fiddle may have been confused with "kit" meaning a little cat.

Whatever the reason, the trade name "catgut" has survived, notwithstanding that modern catgut is, in reality, sheepgut.

To one starting out to investigate the process of manufacture there is early manifested an element of taciturnity and even suppression of all-important information, on the part of manufacturers and their agents, as to the exact manner in which catgut is made. It was, therefore, with a great deal of gratitude that the writer accepted the kind invitation of one of the few manufacturers in this country to visit his factory and see the actual operation.

The small intestines of the sheep arrive in barrels from the abattoir in as fresh condition as practicable. They are washed in tubs of water, then passed between rollers; this squeezes out all contents of the intestine with some of the villi of the mucous layer. The intestines are next macerated in a weak aqueous solution of potassium hydrate for several hours, the object being to loosen up the muscular and mucous layers.

The muscular layers with the adhering peritoneum are now scraped off by an ingenious set of rapidly revolving blunt knives.

The same thing is sometimes accomplished by hand by scraping the intestine with a single blunt knife over a flat board. This is customary in Europe.

After all muscular fibres are removed, the process of wringing out between rubber drums, similar to the clothes-wringing process, is carried on until all of the mucous layer is squeezed out. This requires alternate washing in water and wringing; usually three or four times suffice to deprive the intestine of all its coats save the submucous connective tissue.

Notwithstanding the very rough treatment accorded this delicate tissue, it is still intact

as a tube, and may be inflated throughout its entire length.

The next step is to twist and dry these tubes. Some makers use only the half-cylinder of the intestine away from that to which the mesentery is attached. They claim that the outer half contains less fat and blood-vessels, and consequently is stronger in connective tissue.

To this end, they use a double-edged knife inserted in a suitable handle to split the tube into two half-cylinders, the thinner one being saved for fine strings.

The various sizes of catgut depend upon the number of tubes or half-tubes taken together and twisted. The medium sizes contain three or four strands and are prepared in the following manner: The cleaned tubes, still wet from the stripping process, are held together at one end in a clamp, while the other end is attached to a revolving spindle. Twenty to thirty revolutions are given, then the free end is also clamped and the gut allowed to partially dry; it is then subjected to sulphur fumes for half an hour; this twisting and bleaching process is repeated, usually three times or until the gut is sufficiently twisted, after which all unevenness is reduced by rubbing with moist cloth and pumice. It is now removed from the "frame," is coiled in small packages, and wrapped in tissue-paper ready for the market. This is essentially the complete process of manufacture of crude catgut.

Catgut factories belong to the class of disagreeable manufactures called by the French "boyauderie." Early in this century, in France, the attention of medical men and legislative bodies was called to the unhealthfulness produced by the boyauderies, and successful steps were taken to abate the nuisance.

The factories are scattered over Italy, France, and Germany, also a few in Great Britain, and there are two in the United States of America. The quality of the gut is influenced by the climate and by the condition of the animal. Thus, the mild and sunny climate of Italy is preferred to the moisture of England. The old and poorly-nourished sheep (in France sometimes the horse) are better, on account of less fat and more connective-tissue matrix in the intestine. It may be of interest to note that out of this same material other articles are made, as the sausage-casings, textile and silk-mill strings, racket and bowstrings, musical gut string, whip-cord, clock-weight cords, one kind of condom (from the submucosa of the cæcum), and recently, Halstead, of Johns Hopkins Hospital, has introduced a "gut-wool," made by shredding the submucosa with a tobacco-cutting machine. This gut-wool is used to plug bleeding-points in bone.

In reviewing this conversion from the natural fresh intestine, we are at once impressed by the possibilities of infection and contamination. These, at first, seem unnecessary, and may even offend not only our surgical, but our æsthetic sense of cleanliness. However, from the very nature of the article, it is impossible to treat the intestine from beginning to end in an antiseptic manner. No doubt the early treatment by potassium hydrate immersion and sulphur fumes serves a feeble antiseptic purpose, but is far from complete. And this fact emphasizes the necessity for thorough disinfection of the finished product; for to the above objections must be added the possibilities of anthrax bacilli and spores, or other infectious material, pre-existing in the sheep, also infection from exposure of handling in transport to the surgeon's laboratory.

Desirable Qualities.—Absolute sterilization is by far the greatest desideratum! But the gut is well-nigh worthless unless as much care be exercised to render it sufficiently strong, flexible, inelastic to stress, non-irritating, and capable of absorption.

These qualities should be tested with a view to the actual condition under which catgut is placed when applied surgically.

Histology.—As has been shown, catgut is derived from the submucous coat of the sheep's small intestine. It is therefore connective tissue. This consists of a matrix of inextensible white wavy fibrillæ cemented into bundles, and associated with these are some curved yellow elastic fibres.

It is this matrix, containing the usual fat, that we must consider in our treatment.

Chemical and Physical Properties.—Were catgut as simple in structure and use as gauze, there would be no difficulty in finding an appropriate method of preparation. But, on the contrary, it is a rather complex substance, and before we can rationally discuss disinfectant treatment, the chemical and physical properties should be considered.

Chemical Properties.—The substance of which the matrix is composed is collagen ($C_{102}H_{149}N_{31}O_{38}$), a complex albuminoid and probably anhydrous gelatin. So these fibres may be said to be organized collagen or gelatin, and must be treated as such.

It is proved chemically that by hydrating agents, as heating by superheated steam, gastric juice, etc., collagen is converted into peptone-like substances. The practical point to be adduced is that sterilization of catgut by

superheated steam is contraindicated in that the gut tends to turn into a peptone-like substance. This was further proved by an actual test in which the gut was very much softened by exposure to superheated steam.

Also, it might be observed that catgut would readily succumb to gastric juice, and therefore, were that substance present, unless the gut were thoroughly tanned by chromic acid, mercuric chloride, or tannin, it should not be used.

Gelatin (the anhydrous collagen) may be obtained by boiling or long soaking catgut or connective tissue in water.

It is, therefore, impracticable to use water in treating catgut. Collagen is insoluble in alcohol, ether, chloroform, xylol, turpentine, juniper oil, clove oil, etc.

The practical point to be noted is, these agents may be employed to dissolve out fat, or may act as media for disinfectant or storage purposes without injury to the tissue substance.

Collagen is insoluble in oil or glycerin; this suggests sterilized or antisepticized oil and glycerin as suitable storage fluids.

Collagen is altered by tannic acid and mercuric chloride. Chromic acid, alum, etc., produce a tanning effect similar to tannic acid and mercuric chloride. This explains how chromicized gut is not so readily absorbed by the tissues.

By actual test I observed that all astringent chemicals, such as chromic acid, permanganate of potassium, strong carbolic acid, and strong bichloride of mercury, lessen the flexibility, render it brittle and weak. D. Braden Kyle (Philadelphia) in studying effect of fluids upon tensile strength, found that all aqueous solutions weakened catgut by as short immersion as twenty minutes. Alcohol and juniper oil had not this effect. This suggests that catgut may be weakened at the time of operation by placing it in an aqueous solution of an antiseptic, such as bichloride of mercury. Alcoholic sublimate solutions are to be preferred, therefore.

Physical Properties.—The natural deposit of fat in the meshes of the matrix is disorganized in the drying and contracting of the gut, and soaks through the tissue, interfering with any chemical treatment, such as with mercuric salts, and prevents thorough saturation of fluids.

It should be dissolved out by ether or xylol at the beginning.

Catgut is hygroscopic and swells up in water, becoming opaque and soft.

Raw catgut swells when immersed in serum; this indicates treatment to prevent this absorbability, for in practice the ligature, suture, or drain is in the presence of serum, and, unless proof against any great amount of absorption, the knot will become "slimy" and slip, the suture will yield and cause gaping of wound, the drain will become a plug.

Lister early recognized this unfortunate property, and endeavored to change the character of the gut by chemical treatment. He found that carbolic acid in oil would produce the desired end. If unprepared catgut was soaked in *dry* carbolic acid and oil, the knot would slip when steeped in serum.

"However, if, instead of using carbolic acid in crystallized form, it be first liquefied by water, we secure a proper gut that does not slip."

On the contrary, Lister took some very *old* catgut and found it not necessary to use the aqueous solution of carbolic acid. Therefore, mere age was sufficient. Thus, incidentally, we find scientific evidence of "seasoning."

As with all twisted strands, alternate moistening and drying tends to untwist the gut, with consequent weakening of tensile strength. To avoid this and the snarling, it is suggested that, after having cleaned the gut of its gross dirt by strong soap, it be wound moderately tight about glass cylinders (the ordinary test-tube would do); each coil should have free access to the fluid. (This is impossible when gut is wound tightly on spools.) This procedure is doubly convenient in that it checks untwisting and snarling, and also affords an easy way to handle from one solution to another.

When catgut is knotted its strength is considerably lessened, owing to the brittleness at the point of tension in the knot. This is a very important item, and, to my knowledge, has not been advanced before in discussing tensile strength of catgut.

Nor am I aware of any tests in which the gut was knotted before applying tension, it having been considered sufficient to test in the usual unknotted form.

When ligating or suturing we invariably tie a knot, then strain to tighten it, and often come to grief in so doing. It is obvious, therefore, that catgut should *always* be judged and tested as to its behavior when knotted.

By a series of tests it will be demonstrated that catgut is able to withstand much less strain when knotted than when unknotted.

Methods of Preparation.—Since Lister first demonstrated the necessity of special preparation of catgut for surgical purposes, innumerable variations and suggestions have been proposed, but of these few have survived the test of practicability. Some methods have been

too laborious to carry out, but the majority have been advocated with the single purpose in view of antisepsis, totally ignoring the physical and chemical properties of catgut. Many have prepared the gut, and by negative results from test-tube cultures have proclaimed their gut sterile.

Results from culture tests are worthless, unless the gut has been shredded and macerated so as to be certain that each particle of the gut has been explored. And, moreover, unless any antiseptic in it has been neutralized, the culture experiments should be checked by implantation in susceptible animals of specifically infected gut subsequently treated by the method of sterilization in question.

In arriving at clinical evidence of the behavior of catgut in wounds, we should bear in mind that it is an albuminoid substance and an excellent culture material.

Mikulicz (*Klinische Jahrbuch von Güttstadt*, 1889) emphasizes this point and says,—

"Suppuration after the use of catgut is not because the gut is not sterile, but because it is an excellent medium for the growth of micro-organisms. Good results can only be obtained when the disinfection of the wound is absolutely certain."

To further this claim, I quote Landerer (*Congress der Deutschen Gesellschaft für Chirurgie*, 1889), who gives the following method for the treatment of dry wounds: "The preparation of the patient, instruments, the field of operation, the surrounding skin, the preparation of the hands of the operator, are all carried out after the methods of Kummell and Fürbinger. The instruments are placed in a three-per-cent. carbolic acid solution. After each cut of the knife the wound should be filled with sterilized gauze. Pads of gauze are used in place of sponges, these being sterilized in steam. All bleeding-points are stopped by torsion, when possible. No drainage is to be used. To prevent the formation of cavities, the wound is closed with a Neuber's continuous étage suture. The wound is covered with a compress of gauze and cotton and the whole surrounded with a moderately tight bandage. Catgut is used for sutures, and is sterilized after the method of Von Bergmann and preserved in alcohol."

Cultures were made from all materials used, but gave negative results. Notwithstanding the treatment, many wounds suppurated, especially when the catgut was used.

All the antiseptic apparatus was examined, but nothing could be found wrong.

No changes have been noticed in the wound until the sixth day, when silk sutures are removed. On the eighth or tenth day the temperature rises, the edges of the wound are swollen and red, and by separating the edges of the wound, deep suppuration can be seen.

The abscess was almost always found in the deeper parts of the wound where the catgut sutures were used.

The suppuration cannot result from a decomposition of blood, because all bleeding has been stopped.

The preparation of the catgut used in the above operations was as follows: The ordinary red gut was wound around large glass spools, and was placed in a five-per-cent. sublimate alcohol (the latter often changed). When this solution remained clear the gut was placed in absolute alcohol. All the catgut used had been many weeks in alcohol. Small pieces of the gut were placed on the various culture media, with, however, negative results, proving that the infection does not arise from the outside of the gut. As the outside of the catgut is absorbed in the wound the central part of the thread comes in contact with the tissues. This probably explains the fact that the abscess generally develops about the eighth or tenth day. The author then took small threads and separated the fibres of the gut with sterilized needles. The fibres thus prepared were dried for two to three hours in order to allow some evaporation of the fluid in the central part of the gut. These were then placed on the culture media as before, and the result was still negative.

Thinking that the germs might still exist in parts that it was impossible to separate, the gut was softened in bouillon and still no result.

Kummell claims that before the wound can be closed it becomes filled with germs, and these act as the source of primary infection. "Possibly the failure to find germs was due to the fact that the sublimate in the gut was not neutralized by ammonium sulphide."

Robb and Ghrisky (Johns Hopkins University) have shown that, under the most rigid antiseptic treatment, micro-organisms are constantly found attached to sutures when these are removed from wounds made by the surgeon, and that skin abscess frequently results from presence of the most common of the micro-organisms found in skin, the *staphylococcus epidermis albus*. This is of slight virulence.

The authors conclude, "A wound, at some time of its existence, always contains organisms. They occur in the stitches or in the secretions.

"The number of the bacteria is influenced by the constricting action of the ligature or

drainage-tube, or anything interfering with the circulation in the tissues."

The fact that in their experiments even wire and silkworm-gut sutures were not exempt, but much less infected than the catgut, is of much significance. We have every reason to believe that the micro-organisms of the catgut sutures fed and thrived on the softening catgut, which was impossible in case of wire and silkworm-gut. This evidence certainly ought to lead us to suppose that septic wounds, with well-prepared catgut in proximity, are not due to septic infection from the gut, but to the fact that the micro-organisms find even the most aseptic gut a suitable nidus for growth. This, indeed, is most discouraging; to think that after all our extensive sterilization of the gut we have but succeeded in producing a perfect culture media for any stray bacteria in the wound. This is certainly an indication for infiltrating the gut with some antiseptic that will inhibit the growth of bacteria in it, and at the same time not render it weak and brittle. This infiltration should be made after the raw gut has been thoroughly sterilized. With this in view, I experimented with several antiseptics and obtained the following results:

(*a*) Bichloride of mercury, in germicidal strength as 1 to 1000, weakens the gut when applied for any length of time, by forming an albuminate of mercury.

(*b*) Carbolic acid renders the heat-sterilized gut brittle. It is to be observed here that the carbolized gut of the instrument-dealers, which is strong, has never been completely sterilized, but simply immersed in carbolic acid and oil, and, as will be shown later, has been proved septic by bacteriological tests.

(*c*) The oil of juniper would readily mix with the lymph of the surrounding part, and therefore be of no use for infiltration purposes.

(*d*) Chromic acid renders the gut brittle, and cannot be used in all tissues; however, it is invaluable for purposes of preserving the gut intact in the body tissues for long periods, and will be referred to under topic of "chromicizing."

(*e*) The double cyanide of mercury and zinc restrains growths of bacteria and is insoluble in the discharges of the wound. This seemingly answers perfectly; but the salt is almost insoluble in alcohol and only slightly soluble in water, consequently I was unable to infiltrate the gut with it.

(*f*) Many of the newer antiseptics are unobtainable in the American market, else would have been tried.

(*g*) Iodoform, although strictly speaking not an antiseptic, might be used, and can be infiltrated to a slight extent in the gut by soaking it in an ethereal solution of iodoform.

(*h*) Pyoktanin, or methyl-blue, has antiseptic qualities, is non-poisonous and non-irritating. Sternberg quotes Jaenicke as follows:

Staphylococcus pyogenes aureus restrained by solution of	1 to 2,000,000
Bacillus anthrax	1 to 1,000,000
Streptococci pyogenes	1 to 333,300

In blood-serum stronger solutions are required. Thus, for staphylococcus pyogenes aureus, 1 to 500,000, and a solution of 1 to 1000 killed all of them. Methyl-blue is readily soluble in alcohol and permeates into every fibre of catgut, and does not materially lessen its tensile strength or affect it in any deleterious way. Pyoktanin is not a perfect substance for the purpose at hand, but approaches nearer than any other antiseptic obtainable, and possesses sufficient virtue to be mentioned. The method of preparing the gut with pyoktanin is as follows: The crude gut is deprived of its fat by soaking in ether twenty-four hours. The gut is then sterilized by boiling in absolute alcohol for one hour in a closed jar; then put it in alcoholic solution of pyoktanin 1 to 1000 for twenty-four hours. It may be stored in dry jars or stored in juniper oil. It cannot be stored in alcohol, for the alcohol would in time dissolve out the pyoktanin, and, on the other hand, juniper oil fixes the substance so that it will not stain the hands in using.

Sterilization.—The general methods of sterilization are as follows: By heat, either dry or moist; by immersion in germicidal solutions, such as carbolic acid, juniper oil, bichloride of mercury, hydronaphtol, chromic acid. The great objection to simply immersing the gut in these solutions is that we cannot be assured of the sterilization of gut clear to the centre. Juniper oil is not capable of destroying the anthrax spore, and all of the others, if of sufficient strength to destroy anthrax, destroy likewise the strength of the gut. Bichloride of mercury forms an albuminate of mercury pellicle and prevents the thorough saturation of the sublimate.

Braatz (Bruns, *Beiträge zur Klinische Chirurgie*, 1891) sterilizes catgut as follows: The raw gut is allowed to soak for two days in ether and is thus deprived of its fat. The ether is removed once or twice. From ether the gut is placed directly in 1 to 1000 aqueous solution of corrosive sublimate and allowed to remain for twenty-four hours. From the sublimate it is transferred to absolute alcohol and

kept there until used. Or, after soaking in ether, the gut is exposed to dry heat at a temperature of 140° C. for four hours, and afterwards kept in absolute alcohol.

Brunner (Bruns, *Beiträge zur Klinische Chirurgie*, 1891) conducted a large number of experiments in regard to the sterilization of catgut, in which the results obtained by growth on artificial culture media were checked by implantation of the gut into tissues of animals, mostly guinea-pigs. He found that catgut which is infected by the anthrax bacillus could be soaked for six hours in a one-tenth-of-one-per-cent. solution of sublimate, and if the sublimate were neutralized by sulphide of ammonium, that inoculation of the gut into the tissues of animals produced death. If the gut was introduced into the tissues without previous neutralization of the sublimate, no bad results followed, this proving that when the antiseptic remained in contact with the gut it inhibited the growth of germs which had not previously been destroyed. It seems clear that the practical point to be deduced from this is that the gut should be impregnated with some antiseptic. A 1 to 500 sublimate solution seemed to destroy all the germs in the catgut after one or two hours' soaking. The catgut employed in these experiments was not deprived of its fat.

Braatz has shown that when the fat is taken out by ether the sublimate acts much more rapidly and powerfully upon the germs contained in the gut.

As a result of his experiments, Brunner found that after soaking the raw catgut in ether for two days and then in 1 to 1000 sublimate for twelve hours, it could be preserved in a solution of sublimate one-tenth of one per cent., absolute alcohol nine hundred parts, glycerin ten parts, and would be found to be absolutely free from living germs.

Reverdin has shown that when catgut is entirely deprived of its fat and is slowly heated so that the hygroscopic moisture is driven out, the temperature can be carried to 140° C., and it is entirely sterile and sufficiently strong for surgical use.

Brunner, believing that dry heat is less penetrating than when employed through a liquid medium, used xylol, a liquid which boils between 136° and 140° C. He was not successful in preventing growths in culture material by two hours' heating of the xylol to boiling-point. A combined method of first heating for three hours in xylol heated to 100° C. and then soaking for three days in a sublimate-alcohol-glycerin solution rendered the gut absolutely sterile. The xylol is heated by placing the jar containing it and the catgut in an ordinary steam sterilizer. (Brunner, *Beiträge zur Klinische Chirurgie*, 1890.)

Zweifel prepares the raw catgut by soaking it forty-eight hours in a 1 to 500 aqueous sublimate solution, then for eight days in juniper oil, and afterwards storing it in absolute alcohol.

As to the tensile strength of the catgut prepared by the different methods, all the disinfected catguts were weaker than raw gut. Chromicized catgut and that prepared according to Reverdin's method showed the best tensile strength. This last fact is especially interesting as showing that the raw gut bears a temperature of 140° C. without injury.

Brunner remarks that this high temperature always renders a strand somewhat brittle, and it is to be noted that tests were applied with the gut unknotted. The sublimated catgut by no means came at the end of the list, but was about medium grade so far as strength was concerned. He states that catgut which has lain for three years in 1 to 1000 sublimate alcohol has still satisfactory strength.

The bacteriological examination shows that all raw catgut gives growths in nutrient culture materials.

The sublimate catgut, in three hundred experiments, showed, almost without exception, no cultures. This sublimate catgut was taken directly from the instrument-makers' samples, and not prepared by the surgeon. Even when the gut was taken out of the alcohol-sublimate solution and passed through the non-sterilized fingers and then placed on culture surfaces, no growths developed. And when fresh cultures of pyogenic micro-organisms were rubbed on the surface of the catgut, growths often did not occur. The carbolized, chromicized, and juniper catgut all showed growth in a considerable percentage of the experiments. The bacillus which is most commonly found in catgut, which in these experiments was found in the culture material, is, however, not pathogenic.

Reverdin's catgut was found completely germ free. The result of all these experiments on catgut obtained directly from the market showed that sublimated and Reverdin's catgut were sterile, but that the carbolized, chromicized, and juniperized catguts frequently contained micro-organisms.

As a result of all his experiments, Brunner concluded that the best methods of preparing catgut is to thoroughly scrub it with a potash soap; then, either directly or after half an hour's soaking in ether, store it for twelve hours in watery sublimate solution 1 to 1000;

then to store it in sublimate one part, absolute alcohol nine hundred parts, glycerin one hundred parts, and immediately before use it should be dipped in watery sublimate solution.

Brunner's final method, published a year later in the same journal, consists in depriving the gut of fat by a two days' soaking in ether, in putting it in a jar which is then filled with xylol and closed (the ordinary preserve jar answers best for this), then heating it for three hours in a steam sterilizer. The xylol is washed out with absolute alcohol and the catgut is preserved in the alcohol-glycerin-sublimate solution already given, and in three days is ready for use.

At the University of Pennsylvania Hospital ligature gut is prepared as follows:

The raw gut is allowed to soak in juniper oil for thirty-six hours, then transferred to absolute alcohol, then wound by sterilized hands on glass spools and put in closed jars of absolute alcohol, and boiled in a steam sterilizer for half an hour; stored in absolute alcohol.

Dr. George R. Fowler, of Brooklyn, has devised an ingenious U-shaped glass tube, each arm being four inches in length. Pieces of gut of ligature length are inserted, the tube filled with alcohol, and ends hermetically sealed. They are then put in a water-bath and boiled for half an hour. Alcohol, under pressure, can be heated to 93.3° C. over the water-bath. These tubes are convenient in private practice. When ligatures are required, the tube is broken by separating the two arms.

When prepared this way, anthrax-infected gut was afterwards sterile.

The late Dr. William Goodell dissolved out fat by commercial ether in twenty-four to forty-eight hours, changed once; gut now immersed for forty-eight hours in 1 to 1000 alcoholic bichloride of mercury, then wound on glass spools and preserved in a mixture of juniper oil two parts, alcohol one part.

Chromicizing.—The benefits of chromicized catgut in certain cases are well known and appreciated. It, however, is somewhat irritant, and cannot be used in brain and eye surgery. The principle underlying the process of chromicizing is one of tanning, so that the living tissue will not so readily absorb the gut. Care must be taken not to carry the process too far, else the gut will be too brittle for use.

Brunner has shown that chromic acid, of strength taken for chromicizing, does not *per se* sterilize the gut. We are then to infer that the gut must be sterilized by some other means.

Heat affords the best means; but it is to be noted that catgut sterilized by heat does not tolerate chromic acid, carbolic acid, or sublimate up to the degree that it would previous to heating.

Professor Doderlin, Leipsic, first soaks the gut in chromic acid solution 1 to 10,000 for ten minutes; then, after evaporating in the air to dryness, sterilizes the gut after Reverdin's method of slowly heating up to 130° C. for two hours. Stores the chromicized and sterilized gut in absolute alcohol.

The method usually pursued in America is: Take a given weight (w.) of dried junipered gut, put in jar and cover with water, 20 w.; then add carbolic acid, 1 w., and chromic acid, $\frac{w.}{20}$, and leave to soak for forty-eight to seventy-two hours, according to size of gut. The threads must be free and loose so as to give free access to every portion of gut. Store in alcohol.

Juniperized catgut has been proved bacteriologically not free from micro-organisms.

No doubt the good clinical results from use of this last chromicizing method can be attributed to the facts that the raw gut happened to be exceptionally free from virulent bacteria, and that the central portion of the gut, which probably contained unsterilized material, was not exposed to softening and culture influences until the surrounding tissues had regained their normal power.

Storage.—By experiment I found that bichloride of mercury and carbolic acid were unsuitable for storage purposes, but that alcohol or juniper oil was to be preferred.

Sterilized glycerin or olive oil does not materially lessen the strength. The following tabulation shows the relative strengths of the same sample of catgut after having been stored in different solutions.

Method.	Strength in alcohol.	In juniper oil and alcohol.	Alcohol-glycerin sublimate.	1 to 20 carbolic.
	Pounds.	Pounds.		
Brunner	12	13	6½	7
Reverdin	14	14	6	8
Pyoktanized	12	12	4½	5¼

Tests.—The bacteriological tests of catgut prepared by the various methods have been extensively and successfully carried out by many eminent bacteriologists and surgeons. It is, therefore, not my province to repeat this mode of testing in the hope of either agreeing or disagreeing with them. However, one of the practical tests—that of the tensile strength, *especially when knotted*—has not been fully investigated.

Methods.—The methods for testing the tensile strength were as follows:

The tensile strength in all was ascertained on a slow, continuous-strain testing-machine.

1. Tensile strength ascertained of raw gut.

2. Tensile strength ascertained of raw gut, *knotted.*

3. Tensile strength ascertained of prepared gut.

4. Tensile strength ascertained of prepared gut, knotted.

5. Tensile strength ascertained of prepared and knotted gut after implantation in the body tissues for different lengths of time.

Experiment.—Under antiseptic precautions, pieces of knotted catgut, prepared after Goodell, Reverdin, Brunner, University of Pennsylvania Hospital, Zweifel, pyoktanized, and chromicized methods, were implanted in definite order in the lumbar muscles of a dog. The first implantation was followed by a period, of three days, after which the operation was repeated on each of the three succeeding days. The dog was chloroformed twenty-four hours after last implantation, wounds examined, the pieces of catgut removed in reversed order of implantation and carefully arranged according to time and method. Those implanted last, therefore, remained one day. Those implanted first remained for six days. These pieces were then labelled and tested for tensile strength. The results should be considered as relative. *The same size* raw gut was used in all these experiments. The following tabulations show results:

Tensile Strength Tests.

Method.	Strength unknotted.	Strength knotted.	Loss when knotted.	Loss when prepared and knotted.
	Pounds.	Pounds.	Pounds.	Pounds.
Raw catgut (E)	25	16½	8½	.....
Goodell	23	14½	8½	10½
Reverdin	23½	14	9½	11
Brunner	23¼	12	11¼	13
University of Pennsylvania Hospital	23	12	11	13
Pyoktanized	23¼	12	11¼	13
Zweifel	22	11	11	14
Chromicized	23	9½	13½	15½

Tests of Implanted Catgut (knotted).

Method.	Strength when implanted.	First day.	Second day.	Third day.	Sixth day.
Goodell	14½	14	12¼	9	6
Reverdin	14	13	10½	8¼	5¼
Brunner	12	11½	9	8	5
University of Pennsylvania Hospital	12	11	8¼	7½	4
Pyoktanized	12	12	10	8¼	6
Zweifel	11	10¼	8	6	3
Chromicized	9½	9½	9½	9	8

Conclusions.—In the surgical preparation of catgut:

(*a*) The gross dirt should be quickly removed by potash soap.

(*b*) As little water as possible (better if none) should come in contact with the gut.

(*c*) The fat should be removed by ether, juniper oil, or xylol, for fat interferes with any subsequent antiseptic treatment.

(*d*) The gut will be stronger if, before sterilization, it be wound moderately tight around glass cylinders, such as test-tubes or beakers. Each part of coil should have free exposure to the fluids.

(*e*) We can never be absolutely certain that gut is sterile unless heat of germicidal degree has been applied.

A temperature of 140° C. for three hours does not materially lessen its tensile strength. Hence the two absolutely reliable methods of sterilization are: 1. Dry heat slowly carried up to 130° to 140° C. and continued for two or three hours. 2. Boiling in absolute alcohol or xylol, in closed jars, in steam sterilizers, continued for one to two hours.

(*f*) Storage solution should not contain any antiseptic that weakens the gut, such as bichloride of mercury and carbolic acid. Absolute alcohol and juniper oil are the best solutions for storage. Pyoktanized gut may be stored in juniper oil or dry sealed jars.

(*g*) Better results are obtained if the gut is taken directly from some antiseptic solution. Hence just before use it should be placed in sublimate alcohol 1 to 1000.

(*h*) In testing prepared catgut, test cultures should be thorough,—*i.e.*, every particle of gut should be explored, and antiseptics, such as bichloride of mercury, should be neutralized. Cultures should be checked by implantation in susceptible animals.

(*i*) The tests for tensile strength should be made with knotted gut. By the tabulations, it will be seen that there is considerable loss of strength when the gut is knotted. Thus, the relative brittleness of gut by methods in which heat was used is as follows:

Reverdin the least, then University of Pennsylvania Hospital, Brunner, pyoktanized, and chromicized in their order of brittleness, chromicized being the most so.

(*j*) That catgut prepared by chromic acid, bichloride of mercury, and pyoktanin is retained longer in tissues, and chromicized longest.

(*k*) Sterilized gut may be infiltrated with the antiseptic pyoktanin without deleterious effect upon the gut. This infiltration is done

to inhibit micro-organismal growth in the gut itself.

SYLLABUS.

Subject.—The Preparation of Surgical Catgut.

Thesis, or Statement.—Catgut Deserves a Place in Surgical Material Equipment—Its Unreliability—Are there Reliable Methods of Sterilization?

History.—Sutures known by the Ancients—Discovery of Ligature by Paré—Animal Tissue Ligature of Modern Use—Catgut first used by Sir Astley Cooper, first prepared by Sir Joseph Lister.

Manufacture.—In Europe and America—Process—From Submucosa of Sheep's Small Intestine—Possibilities of Infection.

Desirable Qualities.—Absolute Sterilization—Also must be Strong, Flexible, Inelastic to Stress, Non-Irritating, and capable of Absorption.

Histology.—Connective Tissue.

Chemical and Physical Properties.—Collagen—Hygroscopic—Fat—Weakening Agents—Tendency to Untwist—Effect of knotting the Gut.

Methods of Preparation.—Heat and Antiseptic Solutions—Heat of Germicidal Degree absolutely Certain—Discussion of Methods proposed—Pyoktanized Gut—Chromicizing—A Tanning Process: its Benefits and Objections.

Storage.—With Results from Experiments.

Tests.—With Gut knotted and unknotted—Experiments by Implantation to ascertain the Strength after Partial Absorption—Tabulations of Tests.

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POSSIBLE RELATIONSHIP BETWEEN THE TUBERCULAR DIATHESIS AND NITROGENOUS METABOLISM.

VERBAL COMMUNICATION MADE TO THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, NOVEMBER 6, 1894.

BY SAMUEL G. DIXON, M.D.,

Curator in Charge, and Professor of Microscopic Technique and Histology, Academy of Natural Sciences of Philadelphia; Member of the American Philosophical Society, and of the College of Physicians of Philadelphia.

THE present seems to be an auspicious time to review the work that has been already done looking towards the securing of immunity from, and the cure of, tuberculosis, and to suggest the lines along which further success in the quest will be most probable. The task may seem futile to some; to others the frequent announcement of the details of our experiments may be tiresome; but so long as this dread malady or group of maladies remains the scourge of humanity that it now is, and so long as there is evident a single untried method or procedure which offers the least hope of ultimate victory, I feel that there should be no cessation of our efforts, and that periodical reports should be made in order that other co-workers may be aided, and in the hope that the ensuing inquiries and discussions may possibly clear up obscure points or indicate new lines of research.

Therefore I may be pardoned if I briefly review once again the results of my work thus far and the suggestions I have made, especially as they lead up to the announcement of a series of new suggestions, the consideration of which, it seems to me, must be very important in the further pursuit and investigation of this great subject.

When, in the *Medical News* of October 19, 1889, antedating by nine months the discovery of tuberculin by Professor Koch, I reported that I had found a changed form of the tubercle-bacillus, and that I had been able to render certain animals insusceptible, for a time at least, to the dread disease, I believed and still do believe that these discoveries, since happily corroborated by others, were of special importance. For, since that which has been accomplished once can be done again, if I really had produced immunity, though but in the slightest degree, there must be underlying my work a germ or essence of truth which, when once revealed, would make the repetition of that result upon the human being obtainable at will. And, as the bacilli had altered in form without human interference, it was evident that they themselves were in some way able to change the condi-

tions of their environment or to produce something therein or within themselves that was hostile to their normal growth and development.

In this connection I would like to state that, whether the credit be ultimately given to Professor Koch or myself, I feel that the discovery of the active principle of tuberculin was most important, for, though I have not as yet felt justified in using it in experimentation upon human beings, and will not until we have more positive knowledge concerning its precise action upon the economy, it has some value for diagnostic purposes, and also has, by its peculiar action upon tubercular tissues, opened the way to a new field of investigation and discussion.

In the course of my attempts to discover the nature of the active principle of the so-called "tuberculin," I produced from the cultures of the bacilli, including their nidus, a substance that strongly suggested a relationship to the amide group of metabolic products,—viz., glycocin, creatin, creatinin, taurin, tyrosin, uric acid, urea, etc. Realizing that the systems of animals suffering from wasting diseases and with defective excretory organs were in an abnormal condition as regards these products of metabolism, I began at once, with the kindly assistance of Professor W. L. Zuill, M.D., D.V.S., a series of physio-pathological experiments, injecting hypodermically certain members of this amide group, such as urea, creatin, taurin, etc., into both healthy and tuberculous animals.* The results from this line of clinical experiments by Zuill, reported by the professor and myself in the *Times and Register* of September 26 and October 17, 1891, are remarkable, to say the least, inasmuch as they so closely correspond in many respects to the results from similar experiments with tuberculin. Moreover, I have used similar injections of certain members of this group in the treatment of a marked case of lupus, with a result of very decided improvement and apparently of practical cure, it being now several months since the patient was discharged, and there being no report as yet of any relapse.† Since these experiments were inaugurated by me a substance—thiosinamin—closely similar to urea in formula has also been used abroad with apparent success in the treatment of lupus.

More recently, Professor Vaughan and Dr. McClintock, of the University of Michigan, have shown that certain nucleins are germicidal, and that there is one of these germicidal nucleins in the serum of the blood.‡ Professor Vaughan has, further, been able to produce by means of yeast nuclein a temporary immunity, at least, to tuberculosis in certain animals, to retard the progress of the disease, and to decrease the virulence of the germ.§ Moreover, hypodermic injections of 40 drops of a two-per-cent. solution of yeast nuclein invariably produced a rise of temperature of from two to four degrees in a patient who had a local tuberculosis.

As to the nature of nucleins, Vaughan states that they are "the chief chemical constituents of the living parts of cells," "the chemical basis of the nucleus of the cell;" "that these nucleins are complex, proteid bodies, consisting of nucleinic acid (which contains a high percentage of phosphorus), in combination with highly complex basic substances; that the nucleinic acid of all nucleins is probably constant, but that the basic substance differs in the respective nucleins;" that these "basic substances yield as decomposition products one or more of the so-called xanthin bodies,—adenin, guanin, sarkin, and xanthin;" and, finally, that the nucleins are "insoluble in dilute acids, soluble in dilute alkalies, and that they resist peptic digestion, by which means they may be separated from most other proteid bodies."

Now, there must be apparent to every one the close relationship existing between the amide group of metabolic products to which I have referred and the nucleins, and possibly tuberculin, especially as we may infer from Vaughan's statements that the active principle of the tubercle-bacillus cell (tuberculin?) is a nuclein, as the nuclein bases yield xanthin bodies which are closely related to uric acid and the above-mentioned amide group,‖ and as "Horbaczewski has ascertained that uric acid is produced from the nuclein of spleen pulp, which contains the antecedent or mother substance of uric acid, this mother substance yielding not only uric acid, but the other xanthin substances."¶ Is it any wonder that the clinical results from the introduction of these bodies into tuberculous subjects are so remarkably similar in character?

The question that naturally first arises in the

* "Proceedings of Academy of Natural Sciences," November 18, 1890.

† Ibid., February 21, 1893.

‡ *Medical News*, December 23, 1893.

§ Annual address to Section 1, Illinois State Medical Society, 1894.

‖ Kirke's "Hand-Book of Physiology;" Waller's "Human Physiology."

¶ Professor Vaughan's address, *loc. cit.*

mind of the investigator is, What is the real nature of tubercular inflammation and of the peculiar action or reaction of the above substances upon tubercular tissues and tuberculous subjects?

I have already stated that I believed that where the lithæmic and tubercular diatheses or conditions were present at the same time in any individual, it was an exception to the rule, and have suggested that it might possibly be advisable to endeavor to produce, by hypodermic injections of certain members of this amide group of metabolic products or otherwise, a temporary condition of gout or lithæmia in our tuberculous subjects, hoping thereby to possibly supply that in which the pathological tissues are deficient or to alter the inflammatory condition of the tissues either in kind or degree,—to change the soil, as it were,—so that either the hostile pathogen could no longer find in those tissues a suitable nidus, habitat, or environment, or that the vital activities and resisting agencies of the body would be increased and strengthened sufficiently to overcome the disease germ before it could multiply and produce its harmful effects in the body.*

To strengthen this suggestion, I need only remind you that the lithæmic condition is one assumed by general consent to be in some way due to or connected with excessive assimilation and metabolism of proteid substances, together with increased oxygenation; while the tuberculous diathesis is manifestly one dependent upon deficient proteid assimilation and decreased oxygenation. Are we not all familiar with the fact that those predisposed to tuberculosis generally resist the disease as long as they can maintain growth or while their metabolic activities furnish *more* than enough pabulum for mere sustenance, and that as soon as that excess of assimilation ceases, tuberculosis develops and eventually overcomes the subject?

I would also like to call your attention to the fact that, so far as I know, no one has attempted to explain the cause or rationale of the noted reactions of tuberculin, nucleins, and the members of the amide group mentioned upon tubercular tissues and tuberculous subjects; but that there is some rational and reasonable connection between these reactions and the facts of the foregoing statements must be patent to every one. If not, these additional remarks concerning the experiments of Horbaczewski, which I quote from Professor Vaughan's article, may serve to emphasize the argument.

"The mother substance from spleen nuclein yields not only uric acid, but the other xanthin substances, as xanthin, sarkin, guanin, and adenin. Uric acid is formed when the antecedent or mother substance is split up in the presence of an oxidizing agent, while the other substances result when the process is carried out in the absence of such agents. This is in complete harmony with the facts which have been ascertained by the conversion of one of these xanthin bodies into other members of the same group. Certain other nucleins as well as that of the spleen serve as antecedents to uric acid. This discovery makes clear a hitherto most perplexing problem which has concerned the chemist, the physiologist, and the clinician. In short, it explains the origin of uric acid in the mammalian body. The chemist had taught us to look upon uric acid as the result of imperfect oxidation, the completed product of which is urea; but the physiologist has been unable to demonstrate this supposed relationship between urea and uric acid. The experiments of Horbaczewski show that the amount of uric acid and other xanthin bodies formed is a measure of nuclein metabolism; in other words, it indicates the number of cells which are suffering disintegration processes. Normally, the white blood-corpuscles constitute the most important and probably the most numerous nucleated cells daily undergoing destructive changes. Therefore any condition which induces an abnormal leucocytosis increases the amount of uric acid. In infants the number of nucleated cells is proportionately larger than in adults and the amount of uric acid formed is correspondingly larger. In the fasting state the white blood-corpuscles are reduced and the uric acid is also diminished. Meat diet increases the number of white corpuscles and consequently the formation of uric acid. Quinine and atropine diminish the number of these corpuscles, and by so doing lessen the amount of uric acid formed; while pilocarpine, antifebrin, and antipyrin have been found to increase both. The increased formation of uric acid and xanthin in leukæmia, phosphorus-poisoning, acute febrile diseases, especially pneumonia, cirrhosis of the liver, and pernicious anæmia now finds an explanation."

I might go further and show how glycosin, leucin, tyrosin, urea, etc., are closely related to the fatty acid series, the amidogen radicle

* *Medical and Surgical Reporter*, September 6, 1890; "Proceedings of Academy of Natural Sciences," November 18, 1890, and February 21, 1893; *Medical Bulletin*, May, 1893.

NH_2 taking the place of H in a hydrocarbon radicle, or a hydrocarbon radicle replacing H in the amidogen radicle,* at the same time recalling to your attention the fact that the abundant administration of fat is essential in the treatment of tuberculosis, and that I have secured some apparently good results by the injection of glycerin, which not only readily combines with the various fatty acids to form fats, but has a decided influence upon the metabolic activity of the liver. Or I might mention that recent investigations seem to indicate that the efficacy of cod-liver oil as a reconstructive in these wasting diseases largely, if not altogether, depends upon its contained alkaloids, three of which have a direct connection with urea in construction and formula, and the others evidently being closely related to a combination of the amidogen with the glycerin radicle.

However, I think that sufficient has been said to open up the very broad question as to whether the conditions that predispose to or favor the development of tuberculosis are not those of faulty, deficient, or abnormal nitrogenous metabolism, and whether the truly scientific method of obtaining immunity against this dread malady will not necessarily come through a thorough understanding of the processes involved and the changes that take place in the various cells and tissues of the body, in so far as they are related to the assimilation, secretion, and excretion of nitrogen and nitrogenous compounds.

Believing that this is largely so, I would, therefore, suggest that future work carried on along the following lines promises to return good results and to lead to substantial ground on which we may base our hopes of eventually securing positive immunity. Such work should include, I think,—

1. A systematic investigation as to the amount of nitrogen secreted by the healthy, the tuberculous, and the lithæmic, and the relative proportion of the various nitrogenous products in each case.

2. A tabulation of the clinical results from the systematic *hypodermic* administration of tuberculin, nucleins, and members of the amide group of metabolic products to healthy, tuberculous, and lithæmic subjects, preferably the same, if possible, as those in the first series of experiments; the results to include full reports as to temperature, secretion and excretion of nitrogen and nitrogen compounds, increase or decrease in white blood-corpuscles, condition of subject, etc. Considerable of this work has been done, but far more is needed. Collateral experiments upon animals would also have their place here and would be of value.

3. Experimentation as to special treatment or diets as would be indicated by a study of the results of the above series of experiments.

Confident that such a work as indicated will be rich in returns to those who undertake it, and trusting that others may be induced by these remarks to join with me in carrying it out, either in general or in detail, I am sure that in whatever way immunity against tuberculosis is eventually secured, it will be, in very truth, a blessing to humanity whose magnitude is almost inconceivable, and which will be measured least of all by the undying fame of its discoverers.

* Waller's "Human Physiology."

AMPUTATION OF BOTH LEGS AT THE KNEE-JOINT FOR PARALYTIC CLUB-FOOT IN A CASE OF SPINA BIFIDA AND COMPLICATED BY CONGENITAL INGUINAL HERNIA,

IN WHICH THE TESTIS AND APPENDIX VERMIFORMIS WERE REMOVED DURING AN OPERATION FOR ITS RADICAL CURE.

Read by Title at the Meeting of the American Orthopædic Association, Washington, 1894.

By William J. Taylor, M.D., Philadelphia, Pa.,

Professor of Orthopædic Surgery in the Philadelphia Polyclinic and College for Graduates in Medicine; Attending Surgeon to St. Agnes's Hospital; Assistant Surgeon to the Orthopædic Hospital and Infirmary for Nervous Diseases.

AMPUTATION at the knee-joints of both lower extremities for congenital paralytic club-foot is seldom found to be necessary as an orthopædic measure, for conservative methods of treatment by means of braces and, if need be, tenotomy, with some one or more of the operations upon the tarsal bones, usually accomplish good and lasting results. Occasionally, however, the deformity is of such a character, and the resulting disability is so great, that no form of appliance or conservative operative procedure will give the desired results. Under these conditions, amputation, followed by properly fitting and accurately adjusted artificial limbs, is our only means of positively benefiting the patient, and the more radical procedure is, therefore, the one to be selected.

A detailed account of one case where this

mode of treatment was carried out with the happiest results will, I trust, prove of interest.

This little patient, a boy aged six years, was admitted into the Orthopædic Hospital and Infirmary for Nervous Diseases, under the care of Dr. W. W. Keen, and it is through his kindness that I am able to make this report.

As assistant surgeon to the hospital, I have been enabled to assist Dr. Keen in the performance of all of the operative procedures here described, and much of the subsequent care and treatment has been intrusted to me.

I have nowhere been able to find recorded an instance of similar deformities, and the remarkable number of serious surgical operations which this patient has passed through in perfect safety and with comparatively little shock and suffering marks his case as unique.

His father, mother, three sisters, and one brother are all living and in good health, and there have been no other cases of deformity in the family. He is the third child born to the mother, and during pregnancy she remembers having had a severe fall, and suffered a great deal of pain during the remainder of the time she was carrying him. Labor was normal, but very painful, and the boy was born with the deformities about to be described. He has always been well, with the exception of an attack of chicken-pox and one of la grippe. All parts of the body, with the exception of the lower limbs, developed as in other children, and he began to crawl at about the average age. His mind developed as rapidly as in the case of the other children. He is a well-nourished child; all the organs are in good condition, except, however, incontinence of urine and fæces. The head, chest, and upper extremities are normally developed. The laminæ and spines of two of the lumbar vertebræ are absent, and there is a small, soft tumor over this site,—a spina bifida.

He has also a complete congenital inguinal hernia on the right side.

The right hip is normal in size and shape; the right femur is normal at the hip-joint, but gradually tapers towards the lower end to a mere blunt point, with an absence of the condyles. The muscles of the thigh are poorly developed, especially towards the knee-joint. There are two bony knobs on the inner side, about the middle third of the thigh; these were thought not connected with the femur, and the skin moves freely over them. The patella is absent. The tibia is dislocated backward and upward upon the femur. It may be completely flexed, but can only be extended to a right angle. The fibula is absent, and the muscles of the leg are much wasted. At the ankle-joint there is a dislocation backward and upward. The foot is inverted and the toes point inward. The great toe is absent. The pulse in the dorsalis pedis is easily distinguished.

The left hip-joint is normal, and the femur is normal to its lower third, where it bifurcates, and there is a knob of bone projecting down and inward. The external portion takes the course of the natural bone to form the knee-joint. The condyles are very small and the patella absent. The knee is dislocated backward and upward, and is flexed, making an angle of about sixty degrees when fully extended. There is a small fibula which turns around the tibia until it comes in front of it at the ankle, the external malleolus being in front. The foot is in extreme talipes varus, the toes pointing inward, while the sole of the foot is turned upward. The left leg is a little larger than the right, and there is slight motion in the left knee-joint. The ankle-joints have no motion on either side, while the motion at the hips is almost perfect. Sensation in both limbs is good, and the electrical conditions of the muscles are normal. (See Fig. 1.)

His manner of moving from place to place is to sit upright upon the floor with all parts of the lower extremities flexed. He then leans his body forward and places his hands upon the floor as far as he can reach, and brings his body up to his hands. In fact, he swings his body, using his arms as one would a pair of crutches.

As his legs and feet were perfectly useless appendages, with no possible hope of their ever becoming serviceable, either with the aid of appliances or by operative measures, it was decided, after very careful consultation, to remove them by amputation and apply in their stead accurately fitting artificial limbs.

It was at first thought that amputation in the middle of the legs would be best, as being the most favorable point for the fitting of artificial limbs; the internal knob of bone, or bifurcation of the femur, and the pieces of bone on the right thigh to be removed at the same time, as they would interfere with the adjustment of the artificial limbs. It was deemed best to operate in instalments, and to permit the patient to recover thoroughly from one operation before attempting another. Accordingly, the first operation was performed January 4, 1893. An incision was made over the knob of bone which projected from the inner side of the left femur, and the skin and fascia dissected off. This was found to be a

pear-shaped piece of bone, projecting from the femur about three inches above the knee, on the inner side, and united to it by bony union. This projection of bone was three and one-eighth inches long by one and one-sixteenth inches in diameter. The portion which was attached to the femur was about three-quarters of an inch in diameter and narrowed to form a neck; a small bursa covered the tip of this prominence. This was removed by sawing through the neck and smoothing the ends with cutting forceps. The artery passed behind this knob of bone and was exposed in the incision, but was not wounded. In view of the character of the tissues, it was found impossible to amputate through the leg as at first proposed. An incision was therefore made over what would ordinarily be the external condyle of the femur, down and around the front of the tibia and up to the inner condyle. This flap was dissected back, the tibia disarticulated at the knee, and a smaller posterior flap cut from the skin. The wound was dressed with sterilized gauze, while a small piece of gauze was introduced between the lips of the wound, for drainage. This wound healed without special incident other than a considerable discharge of serum, which came apparently from a portion of the synovial membrane of the bursa which had not been thoroughly removed at the time of operation.

On March 3, 1893, the stump of the left leg having thoroughly healed and being in perfectly healthy condition, the right leg was amputated at the knee-joint by a similar incision to that used at the former operation. Two knobs of bone about three-quarters of an inch in diameter were found on the inner and middle third of the thigh. The incision was enlarged from its inner angle, and these projections of bone removed by a chisel and rongeur forceps. They were found to be connected with the femur by ligamentous attachments only, and the abductor magnus muscle was attached to them. They were removed with great difficulty, and in so doing the deep femoral artery was cut, as it lay immediately in contact with them. This was, however, easily ligated, and the amount of blood lost was small. A drainage-tube was inserted, and the wound closed and dressed with aseptic gauze. He made a perfect recovery, with no ill effects whatever, from these two severe operations.

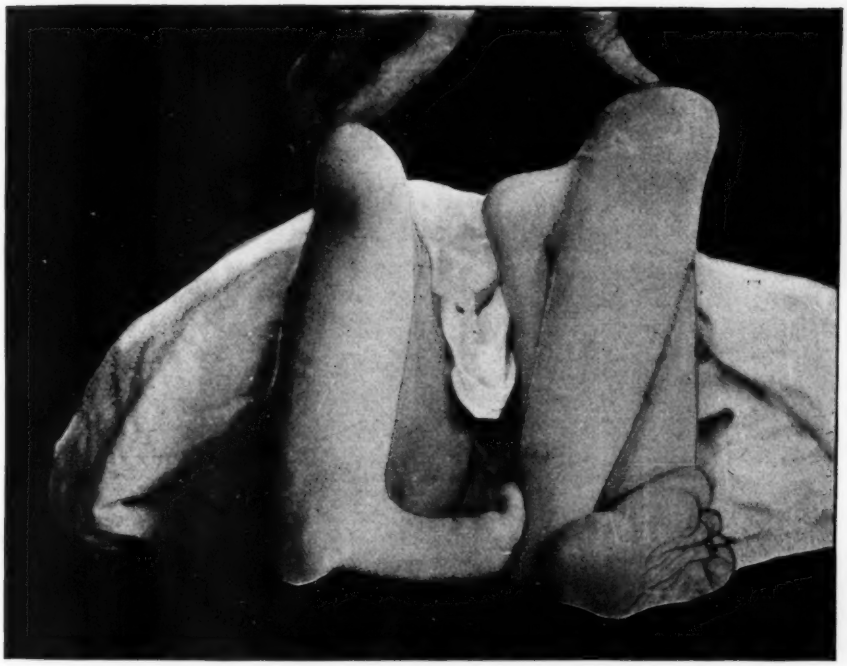
It was found impossible to reduce completely the hernia and to apply any sort of truss which did not give pain by its pressure. As artificial limbs were to be worn, a further appliance in the shape of a truss encircling the waist was not to be thought of. Therefore, on May 24, 1893, after thorough preparation of the parts, Dr. Keen operated upon the hernia, his intention being to use Halsted's modification of Bassini's method. An incision was made four inches long, parallel to and three inches above Poupart's ligament, and the sac opened. Several organs were found in the sac,—the appendix vermiformis, bowel, testicle, and cord. The appendix was three and one-eighth inches long. It was ligated with silk and the lumen of the stump disinfected with pure carbolic acid. The stump was then invaginated and covered by bringing the serous surfaces of the bowel together over it. The testicle was then removed, as it was much atrophied and adherent to the sac, and the sac torn loose and sewed together, the excess of the sac having first been cut off. The appendix, when removed, was much longer than normal, and was attached at its tip to the wall of the hernial sac. When examining it after its removal, a small piece of tough vegetable material was squeezed out of its interior. This appeared to be a small bit of apple-skin, but there were no evidences of inflammatory mischief to its lining mucous membrane. The pillars of the ring were sutured, and, lastly, the skin. A gauze and iodoform collodion dressing, thoroughly sealing the wound, was applied, with an ample covering of gauze dressing. An inverted Y-shaped splint was then applied to the spine, extending downward; to this both thighs were firmly bandaged, to prevent all movement and enable the wound in the loin to close by primary union. From this operation also he recovered without a bad symptom. There was very little shock, from which he rapidly reacted, and his convalescence has been perfect.

From all of these serious and necessarily prolonged operations his rapid recovery was truly remarkable. At no time was his condition such as to cause any alarm, and his temperature chart showed a most gratifying absence of fever. He was perfectly calm and cool throughout, never crying when taken to the operating-room, or manifesting that fear so common to all children, as, indeed, to most adults.

On July 13, 1893, artificial legs were fitted, and by July 25, by a little careful adjustment, he was able to walk around the ward by the aid of a chair which he pushed in front of him, and in a short time with the aid of crutches, and then a cane.

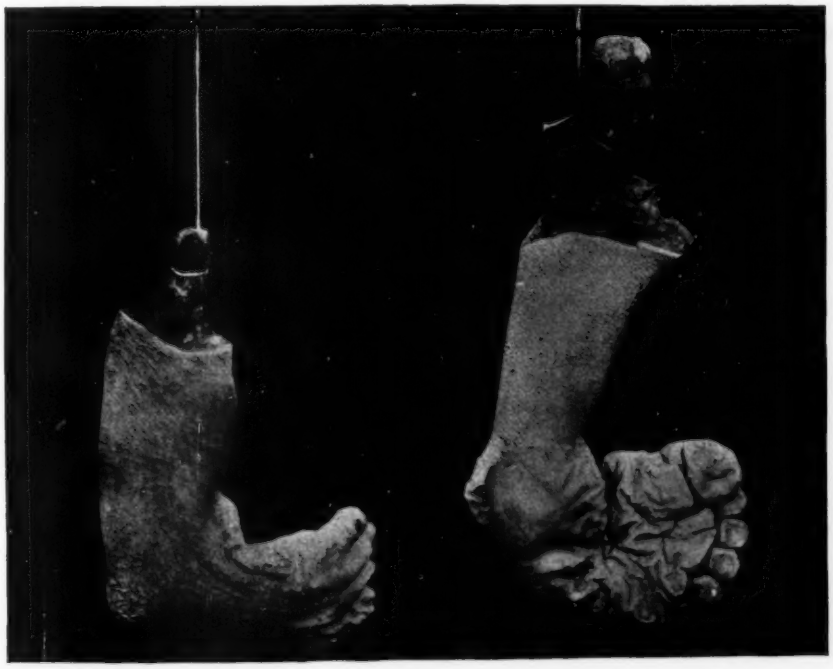
He can now walk alone and without the aid

FIG. 1.



Showing the deformity before operation. Patient lying upon his back in bed, as it was impossible to extend the legs further than a right angle.

FIG. 2.



The legs and feet after their removal.

FIG. 3.

Appearance of the stumps after complete recovery from the amputation, and the scars made in the removal of the projections of bone. It also shows very accurately the hernia.

FIG. 4.

The artificial legs applied.

FIG. 5.

1. Testis. 2. Appendix vermiformis. 3, 4. Bony spines from right femur. 5. Bony spine from left femur.

of crutch or cane, although as a measure of precaution, in moving about upon our polished floors in the hospital, he uses one crutch for security.

These cuts are from photographs taken in part by me and in part by Dr. Boyer, the resident surgeon.

FIG. 1 was taken while he was lying upon his back in bed, as it was impossible to extend the legs farther than a right angle.

Fig. 2 shows the condition of the legs and feet after their removal.

Fig. 3 shows the condition of the stumps after complete recovery from the amputations, with the scars made in the removal of the projections of bones. It also shows very accurately the hernia.

Fig. 4 shows the application of the artificial limbs, which were only made after the most careful and painstaking adjustment by Mr. Osborne, their maker. As will be seen, it was necessary to bring the knee-joint much farther forward than is usual, to compensate for the want of complete control of some of the muscles of the thigh and to enable him to balance perfectly. Elastic running down the shin-bones (?) was necessary to provide sufficient resistance to permit of the extension of the legs in walking.

Fig. 5 shows the three bony projections removed, as well as the atrophied testicle and the enlarged and thicked appendix vermiformis.

THE INFLUENCE OF ATROPINE UPON RESPIRATORY VOLUME.

DR. ALFRED LEVISON (*Berliner Klinische Wochenschrift*, September 24, 1894) declares that the effect of atropine upon respiration is to make it hurried, to increase its size, and to make it spasmodic. Morphine opposes this action. He quotes at some length and with approval the paper by Wood and Cerna on morphine and chloral as respiratory depressants, and atropine, strychnine, and cocaine as respiratory stimulants. Three points, he thinks, need further study:

1. How is the respiratory volume affected when small doses of atropine are brought directly in contact with the respiratory centre?

2. How is the respiration affected when morphine and atropine pass simultaneously into the blood?

3. How is the respiratory volume affected after the administration of atropine when the vagi are cut?

Vollmer has already referred to the first point, and Levison has confirmed his results by injecting atropine into the carotid. There was a marked and immediate increase of the respiratory volume depressed by morphine. This increase was not maintained at its greatest height, but remained always and for the most part considerably above the point at which it was when the atropine was administered. A primary fall, such as is observed when atropine is injected under the skin, was never observed; hence it is assumed that such a fall is due to an action upon the peripheral endings of the vagus in the lungs,—a partial paralysis, which is more than compensated a few minutes subsequently by a central action.

2. Two rabbits of the same litter and about equal weight received, the one morphine alone, the other morphine and atropine. The stronger rabbit received .02 morphine, the weaker .02 morphine and .04 atropine in a vein; proportionately, therefore, more morphine than atropine. In one and a half hours the respiratory volume in the animal which received only morphine had reached only a third of the initial, whereas in the other animal, which received morphine and atropine, the initial number was already reached. Therefore there is here again a clear proof of the antagonism of both alkaloids, when atropine is not given in absolutely poisonous dose.

3. After section of one vagus, the respiratory volume depressed by morphine was raised, but depressed after section of the other vagus. If now, as in both the first experiments, the atropine be injected into a vein, spasmodic respiration, from the intense irritation of the atropine upon the respiratory centre, appears, and the respiratory volume sinks for a moment, but quickly rises again.

Levison maintains:

1. There results from experiments on animals the possibility that atropine in moderate doses is of value in morphine-poisoning in men, the respiration being raised in frequency.

2. This rise is the result of an irritation of the central organ in the brain.

3. The improvement of the heart's activity through atropine is likewise of therapeutic significance.

4. The exciting action even of moderate doses of atropine can easily become paralyzing if it passes directly into the blood.

Levison concludes his paper by referring to reported cases in which atropine had been of service in opium-poisoning.

The Therapeutic Gazette

EDITED BY
H. A. HARE, M.D.,
GENERAL THERAPEUTICS.
AND
EDWARD MARTIN, M.D.,
SURGICAL AND GENITO-URINARY THERAPEUTICS.

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Leading Articles.

THE TREATMENT OF APPENDICITIS.

AT a recent meeting of the College of Physicians of Philadelphia, Dr. John B. Deaver read a paper upon "The Treatment of Appendicitis," in which he reported a large number of operations with a great number of recoveries.

In the discussion which followed, and which was opened by Dr. McBurney, of New York, views were expressed which cannot fail to have an influence in the treatment of this disease hereafter.

Dr. Deaver took the rather advanced stand that practically every case of prolonged acute pain in the right iliac fossa was appendicular in origin, indicated the presence of an appendicitis more or less acute, and that the presence of appendicitis indicated an operation: first, because, if operated upon very early, the mortality is almost *nil;* second, because, if operation is deferred, it becomes more difficult after several attacks, and for this reason and because attacks generally increase in severity, the danger to the patient's life is enhanced. In the early stages of the inflammation the operation may be resorted to, or, if the symptoms are not pressing, it is preferable to wait until the acute symptoms have subsided and then to operate before another attack is superimposed upon the first.

Dr. Deaver also advised the administration of a saline purgative or castor oil in full dose to all cases of appendicitis, with the double object of removing from the bowel indigestible food which may be producing the pain, or, if operation is required, emptying the bowel of fæcal matter.

In the discussion which followed, Dr. McBurney emphasized very strongly the fact, in his opinion, that medical treatment of these cases is always and invariably futile, and that in many instances an attempt at such treatment places the surgeon eventually at a distinct disadvantage, because of the ravages which have been produced by the disease before he has had an opportunity to operate. He disagreed, however, with Dr. Deaver as to the advisability of administering purgatives, as he did not believe that the pains of indigestion were difficult of separation from the pains of appendicitis, and did not regard the emptying of the bowel, except in extraordinary cases, as a necessary preliminary measure to operation. He asserted most emphatically that the appendix was the source of septic infection from the very beginning of appendicular inflammation; that it provided a fertile field for growth of those micro-organisms which, while benign in the healthy intestine, speedily become malignant when, by reason of pathological changes, their growth is more active. He expressed the belief that the septicæmia arising from this local point of infection varied in different individuals, according to their power of septic resistance, just as one man resists the septic infection of a severe post-mortem wound and another dies of a pin-prick while making an autopsy. For these reasons he strongly urged operation upon every appendix which seemed to be in trouble, and, because of his belief in its being a source of infection, urged its removal as early as possible before the general system had become infected. Later in his remarks he admitted that he preferred in the majority of cases to wait twenty-four to forty-eight hours until the acute symptoms had passed by before operating, as the results were usually better under these circumstances, though, should symptoms become fulminating during

this period, operation should not be delayed. After reiterating again and again that all medicinal means were wretched makeshifts in cases of appendicitis, and challenging any medical man present to offer a plan of treatment which could be shown to have any distinctly favorable influence upon the disease, he ceased speaking.

He was followed by Dr. William Osler, of Baltimore, who, as a medical clinician, took the ground that too many appendices were removed and that the operation for appendicitis was passing through the excessive stages which operations upon the tubes and ovaries passed through a few years since. He believes that, while many cases do require operation, many are unnecessarily operated on, and recalled the results of a large number of "post-mortems" made by him in which persons died of other diseases than appendicitis, but in whom evidences of appendicitis having previously existed were present, proving that acute appendicitis could occur with entire cure, without operative interference.

Dr. Hare inquired of Dr. Deaver whether there was not danger in administering active purgatives to patients in whom a perforated appendix possibly existed, on the ground that through this perforation fæcal matter might be swept out into the abdominal cavity, and he quoted a paper of Dr. McBurney's, in which that gentleman had asserted that in all his operations he had never found fæcal matter in the *caput coli*, and that for this reason the administration of a purgative was not needed.

Dr. John Ashhurst then took the ground that Dr. Deaver and Dr. McBurney were far too advanced in their views in regard to operations for appendicitis. He quoted a number of cases in which he had seen active medicinal measures produce cures, and he protested in the name of conservative surgery against the extreme views entertained by the first two speakers, stating that, in his experience, the application of ice over the right iliac fossa and the administration of opium until the respirations dropped to 12 a minute had removed acute inflammations of the appendix in a large proportion of cases. He did not for a moment deny that operation was often needed, but he did assert that it was by no means indicated as a measure of first resort in every case.

Dr. A. V. Meigs, in his remarks, practically agreed with those made by Dr. Ashhurst, and while expressing his willingness to call in a surgeon as a consultant in all cases of appendicitis, declined to admit that surgical aid was necessary in all instances.

In closing the discussion, Dr. Deaver stated that he had seen instances in which the administration of purgatives in cases of perforated appendices had resulted in the escape of fæcal matter into the peritoneal cavity.

As a result of this and other interesting discussions upon this most important topic, we think that fairly definite ideas as to what the general practitioner should do in such cases have been obtained.

In the first place, in many instances he will relieve himself of some responsibility if, from an early stage of the disease, he call to his aid in diagnosis a surgical consultant, who will be called in not to operate, but to watch the case from a surgical stand-point, to determine at its various stages whether an operation is necessary. A surgeon should be chosen who is neither ultra-radical nor ultra-conservative, who will neither urge operation too soon nor postpone it too late; and he should be a man who, while skilled in surgery, has enough regard for the opinion of the medical clinician to permit his own judgment to be influenced by medical opinions, should good reasons be adduced why an operation should not be done, for it is evident that we are rapidly approaching a time when the operation for appendicitis will not be so frequently performed by those who are now reaping a harvest of appendices.

It is also evident that cases of appendicitis may be divided into three classes: those which are fulminating or gangrenous from the moment of their invasion, and which in the majority of the cases are fatal whether operated upon or not; second, those in which medicinal measures or measures applicable by a medical man, such as the application of cold and leeches and opium, are to be tried, and, these failing, operation resorted to soon or late, according to the rapidity of development of the attack; and, third, those cases of appendicitis which, with perfect safety and with entire cure, may remain untouched by the knife, and in which purely medical measures bring about the results desired.

While an attack of appendicitis may predispose a patient to subsequent attacks, operations to avoid attacks cannot be considered as advisable, since they simply deal with the possibilities and not certainties of the future, and it is only after a man has had one severe or several rapidly succeeding attacks of appendicitis that an operation should be resorted to during the period of quiescence as a prophylactic measure.

An interesting part of the discussion was the statement by Dr. S. Weir Mitchell that in some

cases of appendicitis post-operative neuroses or other nervous complications sometimes occur, and that he knew of a case, or cases, in which, following operation, the pain and discomfort in the abdomen were so excessive as to incapacitate the patient from all employment and to render the remedy worse than the disease.

Dr. Deaver also called attention to the fact that the removal of a chronically diseased appendix relieved chronic intestinal dyspepsia and diarrhœa in many cases, a fact first insisted upon by Dr. J. H. Musser, of Philadelphia.

OPERATION FOR CURE OF CARCINOMA OF THE BREAST.

THIS subject, always a live one from the frequency with which the disease is encountered and from its almost uniform fatality, whether operation be performed or not, has again been revived by Halsted ("Johns Hopkins Hospital Reports," vol. iv., No. 6), who claims as the result of more thorough operation, than is generally performed, results so very much better than those usually obtained that his paper merits most careful attention.

Of forty-five cases in which full details of the post-operative course were obtainable, there was local recurrence in three, regional recurrence in eight more. By local recurrence is meant a return of the disease in an apparent or buried scar. Billroth, by regional recurrence, designated a return of the cancer in or about a scar after a long time, explaining these cases on the basis of the cancer diathesis.

Halsted reserves this term for skin metastases at a greater or less distance from the scar, holding that the surgeon has no guide for the so-called lenticular and apparently discrete metastases of the skin, since one may literally flay the patient's chest and side only to find some weeks or months later one or more cancer nodules in the skin of the neck, back, or abdomen. He states that these lenticular skin metastases are distinguished from local recurrences in that they are believed to have formed against the lymphatic current and to have no connection either with the original tumor or with each other. So far as local and regional recurrence is concerned, seventy-three per cent. (thirty-four) are entirely free; there has been a true local recurrence in six per cent. In all of the fifty cases the axillary glands were more or less involved. In seventeen cases the highest intraclavicular glands were also infiltrtaed. In only seven cases was it recorded that this gland was healthy. In at least five cases the supraclavicular glands were also diseased.

Halsted acknowledges the service rendered to surgery by Volkmann when he showed that, even though cancer was apparently not attached to the pectoral muscle, nevertheless the malignant growth quickly penetrates to the fascia. Heidenheim claims, indeed, that when carcinomata have involved the lymphatic channels, they invariably send rootlets to the surface of the muscle, no matter what the thickness of the layer of fat between the breast and muscle may have been; the muscle itself remains healthy for a long time. Necessity for cleaning out the axilla, even when palpation through the healthy skin shows no glandular enlargement, is now pretty generally recognized, and in contrasting the results in his cases with those of others, Halsted tabulated the work of those who recognize this general principle.

Volkmann excised the pectoralis major and sometimes the minor muscles in thirty-eight of his worst cases. In thirteen of these there was neither local nor regional recurrence. In the milder cases the muscles were not removed, and in these the percentage of local recurrence was larger than in the more serious cases.

On the basis of three years' immunity after operation for radical cure, Halsted quotes the operative results in the practice of some distinguished surgeons as follows: Bergmann (Eichel), 30.2 per cent.; Billroth (V. Winnivarter), 4.7 per cent.); Fisher (Henry), 9 per cent.; Gussenbauer (Fink), 16.7 per cent.; König (Hildebrand), 22.5 per cent.; Küster (Schmidt), 21.5 per cent.; Lucke (Dietrich), 16.2 per cent.; Volkmann (Sprengel), 14 per cent.

Halsted's operative technique is as follows: An incision is made around the breast, going wide of any infiltrated skin. This incision is continued upward and outward just below the level of the clavicle to a point on the anterior surface of the shoulder corresponding to the head of the humerus. The cut is carried at once and everywhere through the fat, the skin is dissected outward and to the lower edge of the pectoralis major muscle at the position where the fat forming the superficial fascia of the chest is continuous with that of the axilla.

The costal insertions of the pectoralis major muscle are severed, and the splitting of the muscle, usually between its clavicular and costal portions, is begun, and continued to a point opposite the scalenus tubercle on the clavicle. At this point the clavicular portion of the pectoralis major muscle and the skin overlying it

are cut through hard up to the clavicle; this cut exposes the apex of the axilla. The loose tissue under the clavicular portion (the portion usually left behind) of the pectoralis major is carefully dissected from this muscle as the latter is drawn upward by a broad, sharp retractor; this tissue is rich in lymphatics and is sometimes infiltrated with cancer,—an important fact.

The splitting of the muscle is continued out to the humerus, and the part of the muscle to be removed is now cut through close to its humeral attachment. The whole mass—skin, breast, areolar tissue, and fat circumscribed by the original skin incision—is raised up with some force, to put the submuscular fascia on the stretch, so that it is stripped from the thorax close to the ribs and pectoralis minor muscle. It is well to include the delicate sheath of the minor muscle when this is practicable. The lower outer border of the minor muscle having been passed and clearly exposed, this muscle is divided at right angles to its fibres and at a point a little below its middle. The tissue—more or less rich in lymphatics and often cancerous—over the minor muscle near its coracoid insertion is divided as far out as possible and then reflected inward, in order to liberate or prepare for the reflection upward of this part of the minor muscle.

The upper, outer portion of the minor muscle is drawn upward with a broad, sharp retractor. This liberates the retractor, which, until now, has been holding back the clavicular portion of the pectoralis major muscle.

The small blood-vessels under the minor muscle, near its insertion, must be separated from the muscle with the greatest care. These are embedded in loose connective tissue which seems to be rich in lymphatics and contains more or less fat; this fat is often infiltrated with cancer. These blood-vessels should be dissected out very clean and immediately ligated close to the axillary vein. The ligation of these very delicate vessels should not be postponed, for the clamps occluding them might of their own weight drop off or accidentally be pulled off, or the vessels themselves might be torn away by the clamps. Furthermore, the clamps,—so many of them,—if left on the veins, would be in the way of the operator.

Having exposed the subclavian vein at the highest possible subclavicular point, the contents of the axilla are dissected away with scrupulous care, also with the sharpest possible knife. The glands and fat should not be pulled out with the fingers. The axillary vein should be stripped absolutely clean. Not a particle of extraneous tissue should be included in the ligatures which are applied to the branches—sometimes very minute—of the axillary vessels. In liberating the vein from the tissues to be removed, it is best to push the vein away from the tissues rather than, holding the vein, to push the tissues away from it. It may not always be necessary to expose the artery, but it is well to do so. Sometimes the tissue above the large vessels is infiltrated. It is best to remove all the loose tissue above the vessels and about the axillary plexus of nerves.

Having cleaned the vessels, we may proceed more rapidly to strip the axillary contents from the inner wall of the axilla,—the lateral wall of the thorax. We must grasp the mass to be removed firmly with the left hand and pull it outward and slightly upward with sufficient force to put on the stretch the delicate fascia which still binds it to the chest. This fascia is cut away close to the ribs and serratus magnus muscle.

When we have reached the junction of the posterior and lateral walls of the axilla, or a little sooner, an assistant takes hold of the triangular flap of skin and draws it outward, to assist in spreading out the tissues which lie on the subscapularis, teres major, and latissimus dorsi muscles. The operator, having taken a different hold of the tumor, cleans from within outward the posterior wall of the axilla. Proceeding in this way, we make easy and bloodless a part of the operation which used to be troublesome and bloody. Each bleeding-point is stopped as quickly as possible with an artery forceps. The edges of the wound are approximated by a buried purse-string suture of silk. The triangular flap of skin is used as a lining for the fornix of the axilla; hence the apex of this flap is shifted to a new and lower position. The axilla is never drained and invariably heals by first intention. The uncovered wound often heals by the so-called organization of the blood-clot.

As to the possible disability produced by the operation, it is in most cases so slight as to be absolutely inappreciable. In the majority the arm of the side operated upon has been quite as useful as before the operation.

A study of Halsted's tables shows that of the forty-five cases in which the results as to local recurrence are known, in ten but six months or less have passed since operation. Of the thirty-five remaining cases, there was local or regional recurrence in eleven; also, it must be noted that the period of three years or over without local recurrence has been passed by but four. In one of these, knowledge as to

local or general recurrence was not obtainable. Considering these points, it is still evident that Halsted's results are very much better than any heretofore published. It is true, as he states, that many surgeons of large experience have never seen a cancer of the breast cured. It is also true that the operation as performed by the majority of surgeons in this country offers absolutely no hope of permanent cure and but little chance of non-recurrence *in loco*.

Aside from the figures he gives, the operation he proposes is from theoretical grounds clearly indicated. The tabulation of his cases proves the practical working of this procedure. It is probable that, even with an operation as thorough as that of Halsted's, the ultimate mortality of cancer will still be large, since, before the patients present themselves, the disease will often extend far beyond the reach of his knife; yet, if we can hope for a cure in even twenty per cent. of the cases, this represents an enormous advance in our surgical attainment.

Reports on Therapeutic Progress.

GERMAIN SÉE ON FERRATIN.

The distinguished French savant, PROFESSOR GERMAIN SÉE, reported his views on the therapeutic value and place of ferratin to the Academy of Medicine of Paris, August 21, 1894.

Professor Germain Sée said that he had found occasion during his attendance at the Hôtel-Dieu to employ ferratin and to study its effects on various clinical cases, which he took pleasure in reporting. Ferratin seemed to have a direct significance in the nutrition of the tissues, and even after prolonged use it produced no derangement of the stomach or intestines. It had a pronounced curative effect. Its action was mildly astringent, without causing hurtful excitement or constipation, disturbances commonly following the use of ordinary ferruginous preparations; but, as a remarkable fact, it caused a strong increase of appetite—always precarious and capricious in anæmic patients—and also regulated the movements to a normal condition. Its administration was free from any unpleasant side- or after-effects.

Ferratin, .5 to 1.5 grammes per day in divided doses, was primarily a valuable food-product; it excited appetite and thereby offered a powerful adjuvant in permitting the absorption of food, and it contained a fixed proportion of iron which was highly assimilable, and thus replaced a vital insufficiency.

The administration of ferratin, said Professor Germain Sée, was indicated in those suffering from anæmia from hard work, though the patients have the appearance of good health; those of both sexes affected with chlorosis; those weakened by too rapid growth and puberty; those fatigued by study; and, in short, all in whom a diminution of red blood-corpuscles had ensued, due no matter to what causes.

Professor Germain Sée concluded his report by promising that he would keep the Academy informed as to his further studies of ferratin, which he was conducting simultaneously at the Hôtel-Dieu, in his medical clinic, and in his physiological laboratory.—*American Therapist.*

POTASSIUM NITRATE IN THE TREATMENT OF PHLEGMASIA ALBA DOLENS.

HOVNANIAN describes his use of nitrate of potassium in this affection in the *Medical News* of July 28, 1894.

It has fallen to his lot to treat three well-marked cases of phlegmasia alba dolens with potassium nitrate with such gratifying results as to seem to justify publication.

Mrs. H., twenty-three years old, was delivered of her first child by her family physician with instruments, and sustained extensive lacerations of the cervix uteri and perineum, which at the time were not repaired, but were left for a secondary operation. Twelve days after delivery she complained of pain and heaviness in the left leg, and within three days there developed well-marked phlegmasia. On the fourth day of this complication the writer saw the patient in great agony, with a temperature of 105.2° F., a pulse of 130, and respirations 25. The limb was so turgid and swollen that there seemed to be great danger of gangrene or rupture. The woman was at once given morphine sulphate (⅓ grain) hypodermically, and her limb was wrapped with cotton and placed on a feather pillow at a very obtuse angle. Hovnanian then prescribed a solution of potassium nitrate in water, representing 5-grain doses, to be given every hour until his return. Seven hours later he found his patient in better condition, with a temperature of 103° F., a pulse of 112, and respirations 22, and with less pain and discomfort. The swelling seemed to be less tense and the veins less engorged. The nitrate was continued as before until morning, when he found her in yet better condition. She had slept well during the night, although

she had been wakened regularly for her medicine. Her temperature was 100° F., her pulse 95, her respirations 20. The swelling was reduced to less than half, and the returning circulation was fairly well established. There was no pain whatever and but slight tenderness on pressure. The medicine was continued every two hours during the day, until the author saw her late in the evening, with a temperature of 99° F., a pulse of 90, and respirations 18. The swelling had almost entirely gone and everything was in good condition. The nitrate was continued for two days in smaller doses and at longer intervals, and then discontinued.

Two other equally typical cases are also recorded in this paper.

TREATMENT OF HERNIA IN CHILDREN.

The *Post-Graduate* for September, 1894, contains an article by DE GARMO, in the course of which he asserts that the knife is seldom needed in the cure of hernia in early life. There may be reasons in some cases when it is better to obtain a cure in two or three weeks by operation, rather than have the child wear a truss for one or two years. If, however, the matter is honestly placed before the parents, it will be found that in almost every instance they would prefer bringing the child regularly to the physician for a year or more until cured, to having the operation.

These are tempting cases to the over-ambitious young surgeon, as almost any operation is followed by cure.

Mechanical treatment can be begun at any time after the child is ten days or two weeks old; the earlier the better. It is an erroneous and unfortunately common idea that children will "outgrow" this defect.

There is no bandage or makeshift of any description that will take the place, either for comfort or efficiency, of a carefully applied truss containing a metallic spring.

What style of truss, of the many on the market, shall we select, for there are many good ones and many bad ones. All infant trusses should be condemned which are made to apply from the same side of the rupture; this includes all German or French styles, also all of those whose pad is placed upon a descending arm at a level lower than the pelvic spring, and all trusses cushioned or padded with soft material.

The springs should be so tempered that they may be bent to the exact shape of the child's body, and the entire truss should be impervious to moisture, that it may be frequently washed.

The more simple it is in construction the better. For the treatment of a single inguinal hernia in childhood, the spring, which from the pad crosses the front of the abdomen, passes around the hip of the opposite side and across the back, is one of the most valuable appliances that can be used; it can be found in almost every drug-store in the land. Covered either with hard rubber or celluloid, it is known in the trade as a "cross-body" truss. The celluloid have the advantage of being readily shaped without heating the spring, but are not as durable as those covered with rubber; both are excellent trusses.

The author uses in his private practice and clinic a German-silver spring made on the "Hood" pattern, which has given him great satisfaction. A similar truss has been made with celluloid covering and is known to the trade as the celluloid Hood truss.

The measure for selecting the size of the truss should begin just above where the hernia is seen,—*i.e.*, over the internal ring,—and pass around the hips midway between the crest of the ilium and the trochanter major, to point of starting, giving the circumference in number of inches.

The method of taking the shape by means of a strip of sheet-lead, as taught by the writer for many years, is a great aid. It consists of securing a tracing on paper of the exact shape of the hips at the point covered by the truss-spring. A piece of sheet-lead one-sixteenth of an inch thick, about half an inch wide, and long enough to go at least two-thirds around the child, is used for this purpose. Place one end of the lead over the inguinal canal, with the strip resting across the abdomen. Mould the lead to the shape of the abdomen and pass it around the hip opposite to the hernia and across the back. Press the lead to the exact shape of the hip and back, and then slip it off, place on a sheet of paper, and make a tracing of its inner surface with a pencil. The shape of the other hip may be taken in the same way, giving an approximately correct diagram of the pelvis. In shaping the spring, this diagram is used instead of the child. If a spring covered with hard rubber is used, it should be passed through the flame of a spirit-lamp until it is quite warm, and it can then be bent to the exact shape required.

In locating the truss-pad, see that its lower edge does not come below the external ring; its pressure should be well over the internal ring.

LOCAL ANÆSTHESIA.

This subject is one especially interesting to the practitioner who does any minor surgery, and who does not? It is written of by CARR in the *Virginia Medical Monthly* for August, 1894. He says that in the gum or mouth ¼ grain of cocaine is a perfectly safe dose given hypodermically, and it may be repeated safely in ten minutes if no disagreeable symptoms appear. In the neck, face, and scalp ½ grain may be given as a safe dose, and in the trunk and extremities 1 grain. In these doses no unpleasant effects will be observed unless the patient is very susceptible, and even in the extremely susceptible there will be no danger. If there is any suspicion of the existence of marked idiosyncrasy, and the operation can be put off for a few days, it is a good plan to try the effect of the drug in gradually increasing doses by the mouth. A tolerance for it can in this way be rapidly established.

Whenever the anatomy of the part will permit, a rubber band or ligature should be applied above the seat of operation. This will prevent absorption, and the dose may be largely increased without danger. In operations upon the extremities this can always be done, and 2 grains can be given with safety and to the average individual without unpleasant effect.

The author has given in this way 4½ grains for the synchronous amputation of three toes, with no effect except some mental exhilaration and talkativeness. He gives no rule as to the safe dose in small children. He has never had occasion to use it hypodermically in any patient under eight years of age.

The following rules should be observed:

1. Keep the syringe in good working order, clean and aseptic. Use a small, sharp needle and boiled water.

2. Use a four- to eight-per-cent. solution.

3. Disinfect the part with a sublimate solution (1 to 1000 or 1 to 500) before using.

4. In making the first injection, choose the least sensitive spot central to the site of operation, or even two inches distant. Inject at first only a third or a fourth of the quantity you expect to give.

5. If possible, put a rubber ligature around the part above your injection. Make this ligature just tight enough to stop the circulation and prevent bleeding while you are operating; it need not be tight enough to cause much discomfort. This prevents constitutional symptoms and prolongs the local effects.

6. Wait until you get the effect of the first injection, which may be five minutes, or even ten or twelve minutes if it was placed deeply. Then make all subsequent injections by passing the needle through the skin where it has lost sensation and running it along under the skin in the direction indicated.

7. Before beginning to operate, pass the needle all around and beneath the field of operation to see if all parts have been thoroughly anæsthetized. If not, inject a little more at the sensitive spots.

8. If sutures are needed, place them before removing the rubber band, but do not tie them until the band is removed and the bleeding checked. Sensibility soon returns after removing the ligature.

9. If a large dose has been used and constitutional effects are feared, put the ligature back after the operation and leave it for an hour or so. He has found that whiskey intensifies the effects, but that strychnine relieves them promptly, and he considers a hypodermic of strychnine the best antidote to cocaine-poisoning. Cocaine must be used hypodermically on all parts covered by sound skin, but on mucous membranes this is, as a rule, unnecessary and unadvisable. In the mouth and nose, it is best applied by a spray or by rubbing a cocaine tablet over the part to be affected. The latter method is more effective if the tablet can be held against the part for several minutes without producing cough or gagging. Anæsthesia thus produced is incomplete, superficial, and of short duration, but sensation in the mouth is not acute, and it answers a good purpose. Its hypodermic use in the mouth gives no better results. 2 or 3 grains placed in tablet form in the uterus and cervical canal will render dilating and curetting painless, provided we give it fifteen or twenty minutes for absorption, and do not pull the uterus down to do the operation. In operating for lacerated cervix, it is better to inject it into the cervix. Pulling down the uterus for either of these operations is usually unnecessary and Carr thinks is to be condemned. For chancroids and ulcers, it is only necessary to lay a tablet on the surface and allow it to dissolve in the secretion, or, if the surface is large, powder one or two tablets and sprinkle over it; this is much more efficacious than a solution. The same rule holds in the urethra. For passing the sound in a very sensitive urethra, it is only necessary to inject enough of a two-per-cent. solution to distend the urethra; but for cutting strictures, a few drops of a saturated solution, or, better still, a tablet, should be carried back to the stricture. For enlarging the meatus, it is only necessary to place a tablet just within the opening and let it dissolve.

There are many uses for local anæsthesia that are not surgical. The pain of incurable cancers may often be greatly palliated by local applications of cocaine, and carbolic acid in the form of an ointment or of suppositories; and a similar ointment will be found efficacious in superficial neuralgias and other painful affections of the skin. In all chronic affections, however, we should use it cautiously, for fear of inducing the cocaine habit.

In this connection may be mentioned a fact well worth knowing, that chordee may be entirely and promptly relieved by putting on a condom containing 2 or 3 drachms of a two-per-cent. solution of carbolic acid, and that any pain in the penile portion of the urethra or pendulous penis may be controlled in this way. The writer had a patient with a mixed chancre in the meatus who suffered great pain upon micturition. He recommended the condom, and he experienced the greatest relief from putting it on for fifteen or twenty minutes before urinating.

BENZONAPHTHOL AND BISMUTH SALICYLATE IN SUMMER DIARRHŒA.

The term summer diarrhœa is here used to include the various forms of gastro-intestinal disturbance occurring during warm weather, and especially characterized by frequent, loose, or even fluid discharges from the bowel, sometimes attended with pain, sometimes attended with fever, sometimes associated with nausea and vomiting.

While the pathology and etiology of these various forms of disturbance of the alimentary canal vary in particulars, the general factors are the same: an indiscretion in diet, special or general, remembered or forgotten; over-heating or over-exertion in the heat; irritation or inflammation of the gastro-intestinal mucous membrane in whole or in part; bacterial activity; intoxication by absorption of noxæ from the intestines. After the alimentary canal has been cleansed of irritating materials by the most available means, which may be, according to circumstances, lavage of the stomach, irrigation of the bowel, or the administration of a purge, usually calomel, or a mixture of castor oil and spiced syrup of rhubarb (equal parts), and after the diet has been duly regulated, Cohen has observed very satisfactory results from the administration of the following combination:

℞ Benzonaphthol,
Bismuth salicylate,
Dover's powder, of each, gr. v.
In capsule, cachet, or powder.

To an adult, 1 capsule is given every three hours, or as necessary. It is rarely needful to exceed four doses in the twenty-four hours. To children, the same preparation may be given in reduced dosage; thus, to a child of two years he has given,—

℞ Benzonaphthol, gr. ii;
Bismuth salicylate, gr. ii;
Dover's powder, gr. ss.

In the mildest cases benzonaphthol alone has proved efficient, and in many cases the opium is unnecessary; but, as a rule, the combination of the three ingredients in the proportions stated is more promptly efficacious, if present experience can be relied upon, than any other routine treatment he has used. The past season is the second one during which he has employed it.

A word may be added as to diet. It is best, under the conditions stated, to make a complete change in the food, whether of child or of adult. If a child is taking milk in any form,—sterilized, boiled, predigested, or plain,—all milk should for the time being be cut off. It will not harm a child to go without food for a day or two, but as parents cannot readily be brought to see this, it is best to give some substitute. Barley-water and (home-made) beef-juice are the most available. They may be given alternately in small amounts,—from 2 to 4 ounces of barley-water; from 1 to 4 drachms of beef-juice, freshly prepared, every third or fourth hour. If a child has been sick for some time and is much run down, alcohol (from 10 to 20 drops of brandy or whiskey) may be added, or given with water between food-times. Smaller quantities of beef-juice, given more frequently, may sometimes be called for by the special conditions of a particular case. If a child is taking various kinds of food, but not much milk, boiled milk with pancreatic powder may be given, as with adults. As a rule, however, it is advisable to avoid milk until the alimentary canal is rendered aseptic, for milk is quite liable to undergo deleterious change after being swallowed as well as before,—a point that is frequently overlooked.

In the case of adults, it is usually safe to give boiled milk, in some instances adding sufficient pancreatin and sodium bicarbonate to accomplish artificial digestion in the stomach. He usually prescribes 2½ grains of pancreatin and 7½ grains of sodium bicarbonate (*i.e.*, 1 drachm and 3 drachms respectively, divided into twenty-four powders, in waxed papers), to be dissolved in an ounce of cold water, and the solution added to

a teacupful of warm (previously boiled) milk; this is taken every third hour. When the patient refuses milk, or it is for other reasons objectionable, beef-juice, barley-water, tea, coffee, sherry and water, whiskey and water, claret and water, and the like may be given in small quantities. In most cases the whole question of alimentation is a negative rather than a positive one,—to avoid food that will ferment or decompose, or otherwise give rise to irritating products or toxins, for recovery is usually so prompt that the problem of maintaining nutrition does not arise. It is usually best to give water freely, aerated water being preferable.—COHEN, *Medical News*, July 28, 1894.

CONJUNCTIVITIS, ACUTE AND CHRONIC.

MOORE contributes an article on this subject to the *Post-Graduate* of September, 1894. This is, perhaps, one of the most obstinate forms of acute or subacute conjunctivitis to deal with, unless the cause is appreciated. It is best in all cases of conjunctivitis to examine the tear-passages and ascertain their condition. If there is obstruction, treat the nasal end of the lachrymal duct by sprays or powders, and use mercuric bichloride (1 to 8000) on the conjunctival cul-de-sac. If this does not remedy the lachrymal obstruction, then open the canaliculus by the Bowman operation, thus giving free drainage. This, with the use of the antigermicide, will cure the condition. These cases, treated in the ordinary way by the application of astringents to the eyelids, will, as a rule, avail nothing, but speedily respond to the treatment outlined above.

Nasal conjunctivitis, by which we mean inflammation of the mucous membrane of the eyelids, due not to obstruction of the lachrymal duct, but to an interference in the free nasal breathing and ventilation of the head through the nose, due in most instances to a hypertrophic rhinitis, and, perhaps, to enlarged turlenated bodies. The symptoms of these cases persist even when the most approved method of treatment have been used for simple conjunctivitis, and the redness of the eyelids and the blepharitis only gives way when the nasal obstruction and rhinitis is under control. We could cite many cases where this cause had been overlooked, and which speedily recovered on the treatment of the nose and throat.

Traumatic conjunctivitis is frequently met with as the result of the injury of the mucous membrane by the entrance of foreign substances, and which speedily gives way on the removal of the exciting cause. After exposure to the sun's rays, or the impact of air in sailing or rapid driving, we frequently observe a form of conjunctivitis, which we justly call traumatic. We have all seen, doubtless, the conjunctiva sunburnt and air-inflamed. For these forms we use the application of cold compresses ten minutes at a time, four times a day, together with protecting colored glasses and moderate out-door exercise; in fact, most all the simple forms of conjunctivitis do much better in the air than when housed. Occasionally, in traumatic conjunctivitis, with moderate secretion, an eye lotion of alum and boracic acid, three grains each to the ounce of water, will be found efficient and soothing. Electric-light conjunctivitis comes under this class, and is now quite often seen, especially in those engaged in works where the arc light is used. Protection of the eyes by colored glasses and abstinence from the usual employment for a few days will usually rectify this difficulty.

In the treatment of all the forms of simple, acute, or subacute conjunctivitis, we are in the habit of prescribing applications to be made to the closed eyelids of cold water, by means of cloths or pieces of old linen. These dipped in cold water or, better still, placed on a piece of ice and then transferred to the eyelids, make a very soothing and beneficial form of treatment. Then a solution of alum and boracic acid, as mentioned above, is given the patient to use at home, 2 drops in each eye, twice daily.

Purulent conjunctivitis is the most serious of all the inflammations of the membrane we have to deal with, and we know of nothing more sad than the picture so frequently seen of the helpless infant, but a few days old, presented for our care, with both corneæ infiltrated, the eyelids bathed with pus, and the eyes hopelessly destroyed, when, if the appropriate remedies had been used, the child would have been saved a lifetime of misery. Another form seen in the adult is the purulent conjunctivitis caused by the germ of gonorrhœa,—an exceedingly disastrous inflammation, and one that will destroy the eye within forty-eight hours unless treatment is very promptly inaugurated. The eyelids are very much swollen, and the skin red and glossy, and the secretion copious. In either the infant or the adult, if only one eye is affected, the non-affected should be protected and shielded from inoculation by means of "Buller's shield," which is simply a watch crystal held in position by means of adhesive plaster. Thorough cleanliness is godliness in this instance, and should be rigorously carried

out; in fact, this class of patients should only be treated as in-door patients, and then isolated. All things used in removing the secretion from the eyelids should be promptly incinerated, and thus all further danger of contagion removed. The eyes should be cleaned as often as the secretion accumulates,—every half-hour, if necessary. The eyelids should also be opened and the secretion removed by the use of a small syringe, injecting through the cul-de-sac and over the eyeball a solution of mercuric bichloride (1 to 8000), in order to cleanse and, at the same time, act as an antiseptic. If the secretion is considerable and there is not much bleeding from the palpebral conjunctiva, applications should be made by the medical attendant to the everted eyelids of a solution of silver nitrate, ten grains to the ounce of water. This should be in many cases applied twice daily, and continued until the secretion begins to diminish, when the strength of the solution may be reduced to five grains and the applications made once daily. It is extremely important that applications of iced cloths should be kept up in the adult continuously for the first few days and in the infant as frequently as tolerated. The best way is to take a large piece of ice, wrapped in flannel, and upon this place small squares of old linen, and when they are thoroughly cold transfer them to the closed and inflamed eyelids. When the cold becomes too intense, the applications may be interrupted for a time, or when the cornea shows signs of lack of nutrition, they may be altogether omitted, and even warm compresses applied; this, however, is rare. After cleaning and making the silver-nitrate applications, it is best to fill the conjunctival cul-de-sac with vaseline, as it has been found to lessen the secretion and probably render the propagation of the germs more difficult.

CHOICE OF ANÆSTHETIC FOR REMOVAL OF NASO-PHARYNGEAL ADENOIDS.

In the *Medical Chronicle* for August, 1894, MORITZ goes carefully over this subject, which has lately been discussed at a joint meeting of the London Laryngological Society and the Anæsthetists' Society, and, considering the frequent occurrence of cases of naso-pharyngeal adenoids, it must be acknowledged that the subject is one of considerable interest.

Wyatt Wingrave, in a letter to the *British Medical Journal*, drew renewed attention to this subject. He says that he has administered anæsthetics for tonsillotomy and removal of adenoids upward of eleven hundred times. In about ninety per cent. of these cases he has given nitrous oxide gas alone, administered through a modified Clover's gas and ether inhaler, the patient being in a sitting posture, a mouth-prop being inserted before applying the face-piece, while the whole operation was usually completed in less than forty seconds. The supplementary administration of a few whiffs of ether was not always satisfactory, as it increased the struggling and bleeding. In less than twelve cases a second administration of gas was required. He warns against the use of chloroform in these operations, and collates five cases of death under chloroform for removal of adenoids, recorded in the *British Medical Journal* and *Lancet* since May, 1892. He remarks that the use of gas was prompted more "by humanitarian" reasons than with the object of combating serious pain.

Holloway draws attention to two more deaths which had occurred within a fortnight from the administration of chloroform for the removal of adenoids, and he urges again the advisability of being satisfied with the anæsthesia obtainable by nitrous oxide, as generally done at the Central London Throat Hospital. Mr. G. C. Wilkin also uses nitrous oxide, while Dr. Storry administers ether. Mr. Grant Morris, anæsthetist at St. Thomas's, prefers chloroform. He keeps the patient on his back, with the head hanging over the end of the table, and he does not push the anæsthetic, so that the cough reflex will not be abolished.

At the meeting of the Laryngological Society, held on April 11, 1894, of the sixteen gentlemen whose speeches are reported, six are in favor of nitrous oxide alone; but two of these let the inhalation of N_2O be followed by an inhalation of oxygen, and three of them by the administration of ether in more severe cases. Two gentlemen always administer N_2O and ether; one, N_2O, ether, and chloroform; and four give chloroform at once, two giving it until deep anæsthesia, while two others do not push the anæsthetic quite so far.

Considering the diversity of these predilections, Dr. Semon, the president, was therefore justified in pointing out that the discussion had proved the impossibility of laying down arbitrary laws on this question. He considers the practice of performing such operations on outpatients very deplorable, and he objects strongly to the induction of complete anæsthesia; the ocular reflex should be abolished, but the cough reflex should not.

Latterly, the writer has followed the plan advocated by Wroblowski, of Warsaw, who

either paints the parts to be operated upon with a solution of antipyrin (2 parts), cocaine (1 part), and water to 10 parts; or, better still, paints with a ten-per-cent. cocaine solution, and injects a few minutes after in two or three places, under the mucous membrane in each place, 2 minims of a fifty-per-cent. antipyrin solution. Wroblowski was able to remove in this way, painlessly, lamellæ of a deviated nasal septum, operations which lasted half an hour; and the author confirms Wroblowski's statement that not only tonsils and adenoid vegetations may in this way be removed without pain, but that there is no pain afterwards. Wroblowski applies these solutions with similar good results in removal of the lingual tonsil,—a very painful procedure,—and after injecting a few drops of the antipyrin solution under the mucosa with a Heryng's laryngeal syringe, he is able to do painlessly prolonged laryngeal operations. The same application he has made in cases of tubercular ulceration of the larynx where deglutition has become painful and for solid substances impossible. In a patient of this sort, who had not been able to take solid food for about six months, one hour after the injection of a fifty-per-cent. antipyrin solution into the region of each arytenoid body (one division of a Heryng's syringe, equal to 1½ grains of antipyrin, being applied in each place), the patient was able to eat a beefsteak. Soon after the injection a slight burning sensation is felt. This lasts about fifteen minutes; then the local anæsthesia commences, and the loss of sensation lasts from six to twelve hours. The ulcerative tubercular process itself seemed to be favorably influenced by these injections. The author is applying at present, with similar favorable results, a paint (ten per cent. cocaine and thirty per cent. of antipyrin) twice a day to the larynx of a tubercular patient, in whom the deglutition of the saliva even had become extremely painful, and who is now able to take food and to swallow for six to eight hours after each application.

The local application of strong solutions of antipyrin to mucous membranes deserves, therefore, a much wider trial.

Where general anæsthesia is indicated for the removal of adenoids, attention might also again be drawn to bromide of ethyl, so ardently recommended by Hollaender at the Berlin International Medical Congress. This fluid, C_2H_5Br, has its boiling-point at 105° F.; it therefore evaporates quickly; its odor is similar to chloroform. It was first used as a general anæsthetic by Thomas Nunneley, of Leeds, in 1869, who for some time did all his eye operations at the Leeds Infirmary with this anæsthetic. Since then it has been extensively used both in America and in France, mostly for dental operations. Unfortunately, several deaths have been recorded, but Hollaender and others ascribe these to the use of an impure preparation, as until recently it was somewhat difficult to obtain the pure drug, "ethyl bromide," C_2H_5Br, owing to the frequent admixture of ethylene bromide, $C_2H_4Br_2$, a very poisonous drug. Hollaender administers ethyl bromide with an Esmarch chloroform inhaler, holding it closely over the mouth and nose to exclude air, and continually dropping the fluid on until anæsthesia is established, which takes place in thirty to forty seconds, and frequently in ten to twenty seconds. The anæsthesia so obtained is not complete, but is sufficient for small operations. The cornea reflex is not abolished, and it is not advisable to wait for its abolition, but only until the uplifted arm falls powerlessly down. Hollaender then at once proceeds to operate; the anæsthesia lasts two to three minutes, and the patient is in another minute fully awake. The pulse remains unaltered; it sometimes becomes even fuller; the pupils are not influenced; vomiting, a stage of excitement, headache, and other bad effects are said to be rare. From 1 to 3 drachms (3 to 10 grammes) of the drug are usually sufficient for an administration. A slow or continued administration of large doses causes considerable excitation and prevents a narcosis altogether. Though bromide of ethyl is said not to influence the heart, it should not be administered to patients with heart-disease. Schmidt also recommends this drug for anæsthesia in removal of adenoids and tonsils, but he finds that he usually requires a larger quantity of the anæsthetic. He has never seen any serious after-effects; but vomiting, he says, takes place occasionally. He therefore prefers to operate early in the morning, and not to give solid food previous to the operation. Schmidt also mentions that frequently the mouth is tightly closed, through contraction of the masseter muscles, so that a gag becomes requisite.

THE MANAGEMENT OF FACE PRESENTATION.

DAVIS, of the Jefferson College, in the *Medical News* of July 14, 1894, tells us that the treatment best adapted to secure spontaneous labor in face presentations consists in retaining the membranes unbroken until the time of spontaneous rupture; in sustaining the patient's

strength and conserving her energies by suitable feeding, stimulation, and anodynes, and in placing the patient in such a posture as to favor the rotation of the chin anteriorly. When the face looks towards the left side of the mother's pelvis, she should lie upon the left side, her thighs flexed, and the uterus brought as nearly as possible with its long axis corresponding to the axis of her body during labor-pains. Should the fœtal face look towards the right side of her pelvis, she should lie upon her right side. The relation of cause and effect that has been found to exist between obliquity of the uterus in the mother's abdomen and face presentation renders the maintenance of the uterus in a favorable posture during this complication a matter of considerable moment. It is quite possible in such cases for a face presentation to be spontaneously changed into an occipital one, and for the occiput even to rotate spontaneously to the front, if these precautions are observed. The administration of such substances as tend to maintain efficient uterine contractions is certainly indicated in these cases before the membranes rupture. As soon as dilatation is complete, the obstetrician is to choose between radical interference by version, or an effort by the methods of Badelocque and Schatz to correct the face presentation by converting it into an occipital one. His choice in this decision should depend upon the size and shape of the mother's pelvis, the comparative size of the fœtal head, and the condition of the pelvic floor. When no disproportion exists between the head and the pelvis, and when the pelvic floor, although elastic and resistant, offers no undue obstacle to the mechanism of labor, it is certainly proper to allow the head, under good labor-pains and with good extension, to come down upon the pelvic floor in face presentation, and thus an opportunity be given for the mechanism of labor to proceed spontaneously. When, however, there is a disproportion between the head and the pelvis, as evidenced by pelvic proportions less than the average, ascertained by pelvimetry or a large fœtal head, as ascertained by palpation and a thorough vaginal examination under an anæsthetic, the case becomes quite different.

The results of forcible delivery in face presentations under these conditions are anything but satisfactory and encouraging. The literature of the subject abounds in illustrations of difficult deliveries by forceps, craniotomy, and, in some cases, by version, in which the life of the child has been lost and the mother seriously injured. In the light of our present knowledge, the duty of the obstetrician lies in completely changing the presentation, if the pelvis be roomy, by podalic version under anæsthesia by chloroform, or in so enlarging the pelvis that the mechanism of labor in face presentation can continue.

Podalic version for face presentation is familiar as an expedient, and is, in well-selected cases, a prompt and efficient method of treatment. Symphyseotomy is a procedure of too recent date to occupy an established place in these cases in the resources of obstetric art. His resources for considering this a rational procedure are as follows: Personal observation in four symphyseotomies done for disproportion between the head and the pelvis has led him to remark the decided increase of the oblique diameters of the pelvis that follows the separation of the pubic joint. In three of the four cases the fœtal head presented in an occipito-posterior position, in two cases the right occipito-posterior, in one the left. In one of these cases the head presented by the right parietal bone before the pelvis was opened. Remembering the observation by many obstetricians that face presentations are often developed out of occipito-posterior positions, it seems to the author rational that any surgical procedure which should enlarge the oblique diameters of the pelvis, and which naturally favors the descent of the occiput in the arc of the pelvic curve lying between the sacro-iliac joint and the spine of the pubes, would afford rectification of this abnormal presentation. The three cases of occipito-posterior position following symphyseotomy were readily delivered without injury to mother or child.

Obstetricians are familiar with the facility with which faulty presentations of the head and shoulders may be remedied when two conditions are present: first, complete anæsthesia of the mother; and, second, a pelvis of good size in its oblique diameters. Reasoning from the author's experience in the cases cited, these conditions are present after symphyseotomy; and were the spontaneous progress of labor in this presentation to fail, he should much prefer, if the pelvis were of good size and the head not impacted, to perform podalic version; or, if the head were impacted and disproportion existed between the head and the pelvis sufficient to occasion difficulty in labor, the face presentation persisting, the writer should hope for a favorable result from symphyseotomy, converting the face presentation into a vertex presentation, and delivering the occiput in the manner most easily available after the pubic joint had been opened.

TREATMENT OF TYPHOID FEVER.

In the *Medical News* for July 14, 1894, FISK, of Denver, describes his treatment as follows; he has certainly obtained very good results:

Absolute rest. If the patient is seen early in the attack, as gauged by the absence of rose spots and other constitutional symptoms, the writer gives 5 grains of calomel at night, and follows it with a Seidlitz powder or some saline in the morning, and this is the only administration of calomel during the progress of the disease. He then puts the patient on an absolute milk diet, giving a tumblerful every three hours. As a rule, the writer is not influenced by the patient's ideas that it is impossible to take milk, but determines that by his own observation. When he finds this to be true, he has the milk peptonized, and sometimes changes to buttermilk. Extractive matters in the way of broths and extracts are not used, as they always seem to be harmful.

The turpentine mixture used is becoming well known in our hospitals and is meeting with great favor. It is constituted as follows:

℞ Ol. terebinthinæ, ʒii;
Ol. ricini, ʒii;
Bismuth subnit., ʒiii;
Mucil. acaciæ, q. s. ad ʒiv. M.

This must be shaken well, and a teaspoonful given in a little water twenty minutes after the goblet of milk.

The turpentine in this formula seems to be sufficient to keep the tongue moist and to stimulate the bowels; the castor oil keeps up the secretions, and the bismuth acts, as is well known, as a dressing to the inflamed mucous surface; the last also has a constipating effect, which is overcome by the administration of castor oil (from a dessertspoonful to a tablespoonful) every other morning. For the restlessness of the first few days, which is especially marked at night, he uses either 5 grains of Dover's powder, to be repeated once or twice during the night, or 10 drops of McMunn's elixir of opium, to be repeated once or twice, if needed. Water, iced, if preferred, is given freely; lemonade, not too sweet, is allowed, but not to conflict with the taking of the milk. Antipyretics, like antipyrin, antifebrin, acetanilid, phenacetin, and even quinine (for its antipyretic effects), are absolutely forbidden. Stimulation he reserves for necessity, as indicated by marked nervousness, a rapid and feeble pulse, and for the stage of convalescence. In both instances whiskey is preferred, care being taken to secure a good quality. Of heart-tonics, strophanthus is given rather a preference, and at times he resorts to hypodermic injections of strychnine. He has never used the cold baths of Brand; at the utmost, sponging with tepid water seems to be sufficient, though not often employed.

He believes that great care must be taken in feeding a patient in the stage of convalescence. He thinks it is well to keep him on the milk diet indicated, increasing, however, the amount, if needed, for a week after the temperature has come to the normal. He then begins to feed very gradually, preferring animal to starchy diet.

It will be seen that the methods employed are quite different from those advocated by others. The strict adherence to a milk diet is, of course, nothing new, and as far back as 1866 we find Dr. Cotting, of Roxbury, Mass., reporting in the London *Lancet* three hundred and seven cases of typhoid fever treated without drugs of any kind and a mortality of only ten per cent.

Professor Osler, in his recent publication, says, "Milk is the staple article of diet, of which from 3 to 4 pints are given in the twenty-four hours." This is about the amount the writer used.

Dr. Hutchinson says, "Milk as an article of diet is unquestionably to be preferred to all others in typhoid fever."

The administration of turpentine was advocated by the late Professor George B. Wood and indorsed by Dr. Hutchinson, though the dose employed was greatly in excess of that found in the turpentine mixture.

THE COLD POULTICE AS AN ANTIPYRETIC IN HIGH GRADES OF FEVER.

BEDFORD BROWN, in the *Virginia Medical Monthly* for September, 1894, advises the use of the cold poultice. He orders that a sufficient quantity of flaxseed meal to prepare a poultice of suitable dimensions be placed in a common earthen bowl, and over this is poured boiling water, while the meal is constantly stirred with a large spoon until cooked to the consistency of soft mush. This material is then spread on a piece of soft cotton cloth, for an adult; about eighteen inches long and twelve or fourteen wide, or sufficiently long to cover the entire abdomen, from the pubis upward, extending at least half-way up the chest, well over the cardiac region, so as to fully cover the heart and half of the chest. This poultice is now covered with another piece of cotton of corresponding dimensions. After being spread and covered, the entire surface to be applied

to the person is frequently besprinkled with ice-water until its temperature goes down to 68° or 70° F., when it is ready for application. At this point the author suggests that the poultice be not spread too thick, as in that case it would prove oppressive to the patient.

The poultice as thus prepared is applied over the chest, from above the cardiac region to the pubis. In the writer's experience with it, which dates back fifteen years, he has never known it produce shock to the nervous system or discomfort to the patient. On the contrary, patients with high fever, who have learned its advantages, will often request it when they feel sensations of rise of temperature. Its work, different from that of the cold bath, is accomplished slowly, gradually, gently, and effectually. The cold poultice applied in this way is a good substitute for the cold bath, without its many disadvantages, dangers, and difficulties of application.

In cases of fever, with a dangerous degree of hyperpyrexia, say 106° or 106.5° F., with delirium, insomnia, constant restlessness, contracted pupil, scanty, high-colored urine, these symptoms clearly indicate that this intense degree of temperature is exerting a destructive influence on the great nervous centres,—the brain and spinal cord; and if prompt measures are not taken to reduce this hyperpyrexia to a safe degree, the brain and spinal cord will be overwhelmed in hopeless ruin. This can only be accomplished either by the cold bath, internal antipyretics, or the cold poultice. In certain cases in the author's practice the latter measure, applied over the entire spinal column, from the cervical vertebræ to the sacrum, with these symptoms, has exerted a marvellous effect in relieving the nervous system, in subduing inordinate nervous erethism, relieving delirium and restlessness, and in promoting sleep.

In a case of this kind, during a relapse from a four weeks' illness, where the temperature approached 106° F., pulse 130, utter sleeplessness, and constant restlessness, a long poultice, at 70° F., was applied from above the cardiac region to the pubis; another, at the same temperature, ten inches wide, was applied over the nucha to the sacrum, and the head having been shaved, an ice-bag was applied over the head. In two hours there was a reduction of two degrees; in twelve hours a reduction of five degrees, with copious warm perspiration, with the result of refreshing sleep, nervous composure, relief of delirium, and reduction of the pulse to 100. On one or two occasions subsequently, when there was manifested a disposition of these symptoms to return, the same remedies were applied, with identical results, and under the usual treatment the case terminated in recovery.

In the treatment of acute peritonitis the powers of the cold poultice have not been tested by him as an antipyretic and antiphlogistic. He believes that in this class of cases poultices, at a temperature of 70° F., applied systematically at intervals of one hour, would exert a beneficial influence.

There is a certain degree of art to be observed in the preparation of these poultices. They should not be spread so thick and heavy as to weight down the patient and cause a sense of oppression; not over a quarter of an inch in thickness, and then reduced to a uniform temperature, as tested by the clinical thermometer. In cases of temperature not exceeding 102° F., Brown often orders a cold poultice at first made with hot water, and then permitted to cool either by the atmosphere or application of ordinary hydrant- or pump-water, and obtains excellent results.

SOME POINTS IN THE TREATMENT OF TYPHOID FEVER.

In the *Medical Press and Circular* for August 22, 1894, BROADBENT writes on this topic. In intestinal hemorrhage the treatment on which the author has come to rely is the placing of a large ice bag over the right iliac fossa, the administration of a full dose of some liquid preparation of opium, and the subcutaneous injection of ergotin. 10 or 15 minims of turpentine may also be given every three or four hours. The object of the opium is to paralyze the bowel. The blood poured out into the intestinal canal excites peristalsis, and the peristalsis, in turn, tends to prevent the formation of clot on the bleeding surface, which might seal up the vessels. It must, therefore, be arrested; and it is because opium given by the mouth appears to effect this better than morphine hypodermically that this method of administration is preferred. ½ drachm of laudanum, or its equivalent of liquor opii, may be given at once. Opium, again, seems to have a certain sustaining power. Astringents, supposed to act directly on the bleeding vessels, are useless; long before they have traversed the twelve or sixteen feet of bowel to reach the ulcers they will have expended their power of coagulating blood or astringing tissues. When the medical man lives at a distance from the patient, the nurses should be provided with an ice bag, laudanum, and hypodermic pellets of ergotin, and have instructions to employ them immediately on the occurrence of serious hemorrhage.

Great caution must be exercised in administering stimulants. The half-fainting condition affords the best opportunity for the bleeding to cease, and the longer the patient can be kept in this state with safety the greater is the chance of the arrest being final. Perforation of the bowel is almost always fatal, but the writer has seen at least two cases of recovery in which, from the symptoms at the time and the formation of a dense mass of thickening between the umbilicus and the right iliac fossa, he has had no doubt of its occurrence. The one chance for the patient is the administration of a large dose of opium or morphine for the double purpose of minimizing the terrible shock which attends perforation and of arresting intestinal peristalsis, and so minimizing the extravasation of the contents and affording an opportunity for adhesions. The writer should not hesitate to inject ½ grain of morphine under the skin and give 30 or 40 minims of laudanum by the mouth.

We come now to the third great source of danger in typhoid fever,—the protracted high temperature. One of Sir William Gull's pregnant sayings was that the removal of symptoms is not the same thing as the relief of disease. The antipyretics not only knock down the temperature, but the patient also, sometimes fatally. The writer's conclusions are based entirely upon observation, but it is interesting to learn that Roque and Weill have found out that antipyrin arrests the elimination of toxines by the urine without preventing their formation. Quinine has done good in large doses as against high temperature. The most efficacious means of controlling the heat of fever, however, is the application of water to the surface of the body. The good results of the bath treatment have long been known to the profession in this country, but it has not come at all into general use. The principal reason, no doubt, is that cold bathing is usually very distressing to the patient, that the labor involved is great, and that in the general hospitals it is difficult to make the special provision required and to supply the additional number of nurses.

ON THE EFFECT OF GIVING LEVULOSE AND INULIN TO PATIENTS SUFFERING FROM DIABETES MELLITUS.

HAYCRAFT records the results obtained in three cases of diabetes by giving levulose as a carbohydrate food. The patients were placed on a fixed diet, from which the carbohydrates were excluded as far as possible and the sugar estimated in the urine. In alternate periods of three days, fifty-five grammes of levulose were given per diem in six doses. The quantity of sugar excreted was determined by Fehling's solution and by polarization.

In the first case (one of acute diabetes) the average increase of sugar excretion in the urine produced by the administration of levulose was one hundred and six grammes for the period of three days. During this period the patient had taken fifty-five multiplied by three equals one hundred and sixty-five grammes of levulose. Of this, nine grammes (equals five per cent.) were excreted again as levulose; ninety-seven grammes (equals fifty-nine per cent.) were excreted as glucose; fifty-nine grammes (equals thirty-seven per cent.) remained in the organism. Similar results were obtained in a second case of acute diabetes.

In a third case (one of chronic diabetes in an old person) all the levulose taken was utilized in the organism, and there was no increase in the glucose excreted.

Experiments on rabbits showed that glycogen can be formed from levulose. A rabbit was kept without food for six days. (At the end of this time one may assume that all the glycogen in the liver would have disappeared.) Then a solution containing 15 grammes of levulose was injected into the stomach; four hours later the animal was killed. A large quantity of glycogen was found in the liver. In four other rabbits the experiment was repeated; they were kept for seven days without food. Two were killed, and to the two others were given 15 grammes each of levulose, and both were killed four hours later. No glycogen was found in the liver of the first two rabbits, but it was present in the liver of the two which had received the levulose.

From the above observations and experiments the author draws the following conclusions:

1. A patient suffering from chronic diabetes can utilize fifty grammes or more of levulose daily.

2. In some acute cases a part of the levulose taken with the food is excreted as such, a part is utilized in the body, and a part is transformed into glucose.

3. In rabbits, glycogen is formed from the levulose taken, and is stored up in the liver.

Hale White records the result of a number of careful experiments on eight diabetic patients with regard to the effect of giving levulose and inulin. Levulose prepared by Von Schering was employed, and inulin in the form of dahlia

tubers was given. The following are the conclusions at which he arrives:

1. If large amounts of levulose are given, some of it appears in the urine.

2. In none of these cases did levulose have the pernicious effect—often seen with ordinary carbohydrates—of increasing the output of sugar beyond the extra quantity given.

3. When levulose is given, the excretion of sugar is usually increased, but it may be diminished.

4. In most cases much less sugar is passed in the urine after giving levulose than would have been excreted if the previous excretion of sugar had remained stationary and all the levulose had appeared in the urine. This result seems to indicate that in these cases some of the levulose given was retained and used up in the body.

5. There is some evidence that the larger the amount of levulose the less will be the increase of sugar in the urine.

6. While, therefore, some of these cases show that levulose can be utilized better than dextrose, none of them show that dextrose can be utilized better than levulose.

7. None of the patients felt worse for taking levulose; indeed, some felt better and gained in weight.

8. Probably a moderate amount of dahlia tubers, taken as a vegetable by patients suffering from diabetes, would do no harm.

9. The effects of levulose on the excretion of urea is unimportant.

10. The amount of urine passed when levulose is given varies with the quantity of sugar passed.—*Medical Chronicle*, September, 1894.

MALARIA AND ITS THERAPEUTICS.

Previous to entering upon a short discussion as to the therapeutic value of the various drugs described as useful in malaria, FORBES, writing in the *Medical Press and Circular* of July 4, 1894, prefaces his statements by laying down as an axiom "that no single drug should be looked upon as a specific." Before passing to antipyretics, about which so much has been written of late, there is one drug—namely, "opium"—of the utmost use in prevention and cure of many malarious states. It has been stated, on what grounds we cannot conceive, that opium is useless in malaria, except to cure the pains. Not only the author's Indian and African experience proves this to be a false basis and a remark that could not be made truthfully by any practitioner with extended clinical knowledge, but opium is acknowledged by the natives of India and many eminent Indian medical specialists to be of extreme value not only as a prophylactic, but also as a curative agent, by means of its sedative, anodyne, and perhaps most of all by its stimulant properties. These latter are contained in narcotine, which may be termed an extractive of opium; it has been used with some effect in these fevers. Opium is a wonderful stimulant in premonitory stages of fever, and in the case of those who have acquired the opium habit properly, so as to become regular consumers, it acts as a marvellous safeguard against dangerous attacks of fever, and even cholera, dysentery, etc. This is confirmed on all hands by Indian medical officers, some of whose evidence given before the Royal Commission on Opium has been published as extracts in the late numbers of the *British Medical Journal*. A full dose of morphine—say 1 drachm of liq. morphiæ acetatis—is reported by Surgeon-Lieutenant-Colonel Edward Lawrie, of Hyderabad, to have cut short cases of malarious remittent, the temperature in a few hours becoming normal or almost so, with the best results to the patient. Personally, the writer's experience was the same, having a severe attack of African remittent, temperature varying from 104° to 108° F., in spite of antipyrin and aconite. He took three hypodermic tabloids of morphine (¼ grain), one every thirty minutes, and next morning, after sleeping two hours, his temperature was much reduced and he felt almost well. At this juncture it must be premised that each drug does not appear, by observations noted in the tropics, to act in the same fashion as has been observed in temperate climates. And also that residence and practice in the tropics should be deemed the basis on which any knowledge of tropical disease can be acquired or that can enable the surgeon or physician to speak with any authority on these at all times obscure complaints, such as "sleeping sickness" of the Congo, etc. As an initial treatment, $\frac{1}{10}$ grain of pilocarpine nitrat. will generally drench the patient with perspiration and will certainly abort an ordinary attack. He then reviews briefly the medicines generally used in treating these fevers: As antipyretic and anodyne, (1) antipyrin or phenazone is a most valuable drug in both senses, although the writer has to report one death in the Gold Coast Colony from its use; still, the dosage was high; the surgeon in attendance gave upward of one hundred grains in less than twenty-four hours. In this case it was also suspected that the patient had some fatty degeneration of the cardiac fibres. In any case,

in moderate doses, the remedy is most frequently valuable and non-toxic. The author's plan is to give never more than 10 grains, or even 5 grains repeated frequently, say every hour, and if temperature after a few hours shows no sign of fall, the drug should be stopped and recourse had to some other treatment.

Salicinum is a safe and reliable antipyretic; especially in those attacks which exhibit so-called rheumatic symptoms it is a perfect substitute for salicylate of sodium, without any of its dangerous properties.

Phenacetin he has used much and successfully, especially in India, but it is not so sure as antipyrin, and is much more liable to cause unpleasant and even dangerous symptoms. Care should be taken not to employ it in patients with organic heart-disease.

Antifebrin has been lauded as an antipyretic. His experience and that of others does not approve its use, as it is exceedingly liable to cause cardiac troubles and cyanosis.

Aconite in the form of tabloids of tinctura aconiti is reliable, which is more than can generally be said of the British Pharmacopœia tincture, and is undoubtedly the most successful remedy we have in both Indian and African remittents. It can be used when even antipyrin fails, as an anodyne, antipyretic, and analgesic; it is unsurpassed in these complaints by any other drug, and used in remittent fever may be termed "our sheet-anchor." It is poisonous, truly, but its control of the neuro-vascular mechanism is great, and it is, besides, the most powerful drug we have available in this class of disease.

Dover's powder, pulv. ipecac co., may be classed partly as a sudorific anodyne and partly as an antipyretic, and may be given, starting from the initial stage of fever, every hour in 5-grain doses.

Warburg's tincture, an empiric formula (containing opium, quinine, and aromatics), is without its equal in persistent and protracted agues, and can be used, as the author has done before antipyrin, etc., were known, with striking success in some of the worst forms of fever. It is also prophylactic against the return, when expected, of intermittent attacks. Those patients who can take it readily can be sure of great benefit accruing from its occasional use, but its taste is nauseous, unless taken in the tabloid form, quickly swallowed (dose, 1½ to 3 drachms). Should the administration of any or all of the above, given in succession, prove of no avail, our last resource, in strictly speaking antipyretic (it might here be almost called revulsant) treatment, is the cold bath or cold wet pack. These, in skilful hands, have saved many lives, and even in the hands of tyros marked success has resulted.

Potassii bromidum is exceedingly useful in 10-grain doses, when severe headache marks initial stage; it is again useful in delirium, phrenetic symptoms which occur in the sanguine temperament, especially in those giving to overeating and heavy drinking. When vomiting supervenes, and this is common, especially in dysenteric and choleraic remittents, almost all drugs must be given hypodermically, as there is continuous vomiting and diarrhœa every few minutes. In one case the writer made considerable impression on the patient by repeated doses of chlorodyne in one of these choleraic attacks, giving ½-drachm doses. Some of these were rejected, but some were retained, and the patient recovered, although his pulse was subnormal four hours after commencement of attack."

Hazeline, a distilled product from twigs of witch-hazel, is an almost unfailing hæmostatic; it also seems to act as an astringent to intestinal mucous membranes. It is pleasant to take internally, and can be given with good effect in hæmaturia, hæmatemesis, etc., which are frequent in pernicious attacks, both intermittent and remittent, the dose being 1 to 2 drachms. Should this fail, however, inject subcutaneously $\frac{1}{100}$ grain of ergotinin citrat.; this might be a specific. Ice, when it can be obtained, is also extremely useful, and also in acute dysentery.

Apomorphine hydrochlorate, in doses of $\frac{1}{10}$ grain, would cut short an attack of bilious remittent by inducing vomiting. It is sometimes, but rarely, a good practice, vomiting being often only too persistent when once established.

Digitalis tincture has proved useful where heart shows signs of failure, and can be combined with advantage with liquor ferri perchloridi.

Calomel.—In one dose, from 5 to 10 grains, given at beginning of fever, when there is constipation.

Methylene-Blue.—Thayer, in 1892, tried small doses (2 or 3 grains for a dose) on several patients in intermittent fever, with satisfactory results; the drug in no wise gave rise to any unpleasant symptoms, and a cure (temporarily, at all events) resulted. Dr. Pucci says clinically he believes that quinine is responsible for many sequelæ of fever and for the development also of those ictère hæmaturic forms which are so fatal, whereas he used methylene-blue with far different and more successful results. Dr. Rosin confirms this.

Arsenous acid is useful in obstinate intermittents which are often rendured worse by quinine; dose, $\frac{1}{100}$ grain of tabloids of acidi arsenosi.

Quinine (quinine bisulphas) has been up till quite a recent date regarded as a specific, especially in the tropical forms of malarial fever, by even the most eminent and experienced practitioners. Its value as a specific in malaria is confirmed by the dicta of Laveran, Golgi, Hehir, Binz, Manson, and Bacelli (who considers it more powerful as a remedy when subcutaneously injected, and more likely to act directly on the "plasmodium malariæ"). Dr. Beaven Rake says the intracorpuscular pigmented bodies are specially characteristic of acute forms of malaria, and are readily affected by quinine. This can hardly be substantiated by proof adequate against accumulated clinical evidence to the contrary from Europe (Rosin and Pucci), from equatorial Africa (Parke), and from India, wide enough fields for investigation. In his own clinical experience of hundreds of cases of tropical malaria, extending over years, Forbes finds that quinine given in acute malaria is almost as deadly as the disease.

THE HYPODERMIC ADMINISTRATION OF MERCURY.

The number of compounds of mercury which have been used by injection into the tissues is very large, and the author formulates the following rules for their safe employment:

All irritant or caustic preparations are, of course, inadmissible. The liquid injected must be chemically pure and sterile. The syringe must be sterilized in all its parts, and an unoxidizable needle (such as iridized platinum), not less than one and a half inches long, must be used. All injections must be given deeply into the tissues, the needle being inserted perpendicularly to the surface.

The lumbar portion of the back and the gluteal region are the best positions. Care must be taken not to introduce the syringe into a vein. Subsequent injections ought to be two to two and a half inches distant from a previous one.

The interval between each injection varies with the effect produced and the preparation employed,—from twice a day with small quantities of soluble preparations to once a month with large injections of insoluble preparations, such as calomel.

Soluble Injections.—Corrosive sublimate.

Corrosive sublimate, 1 part;
Chloride of sodium, 6 parts;
Sterilized water, 100 parts.

A Pravaz syringeful (about 15 minims) to be injected every day.

To avoid such frequent injections, M. Lukesiewicz injects ½ to 1 syringeful of a stronger solution every four or eight days. Corrosive sublimate can also be dissolved in sterilized oil, so that fifteen minims contain one-sixth of a grain, which is the usual dose.

Periodide of mercury is also well borne and causes little pain. $\frac{1}{16}$ grain may be injected, dissolved in 15 minims of sterilized oil, and repeated every day or every other day, as the case may require.

Succinimide of Mercury.—$\frac{1}{80}$ grain in sterilized water may be given every day.

Sozoiodolate of mercury is very active, but causes much pain. The following is Schwimmer's formula:

Sozoiodolate of mercury, 8 parts;
Iodide of potassium, 14 parts;
Distilled water, 100 parts.

About 6 minims are injected every week, and the dose may be carefully increased.

Insoluble Injections.—Calomel.

Sublimated calomel, 1 part;
Liquid vaseline, 10 parts.

15 minims to be injected every fifteen days.

Yellow oxide may be given in the same dose and manner as calomel.

Gray oil is less active than calomel.

Mercury (purified), 20 parts;
Ethereal tincture of benzoin, 5 parts;
Liquid vaseline, 40 parts.

1½ to 3 minims are injected every eight days.

Thymolate of mercury, 1 part, mixed with 10 parts of liquid vaseline, and 7 to 15 minims given every eight days.

Salicylate of mercury may be used like the thymolate.—MANNIAC, abstract from the *Medical Chronicle*, September, 1894.

SYMPHYSEOTOMY FOR THE RELATIVE INDICATION, WITH COMPLICATIONS.

DAVIS contributes to the *Boston Medical and Surgical Journal* of August 23, 1894, a paper upon this interesting topic. He thinks that in undertaking symphyseotomy in women older than thirty the operator must not trust wholly to the knife; this is the second case in the author's experience in which a condition of partial ossification has resisted the Galbiati

knife and probe-pointed bistoury. The occurrence of thrombosis during convalescence may be explained by the dislodgement of septic thrombi in the uterine sinuses, although it is not perfectly clear how such infected thrombi could cause no disturbance before the patient turned. A more rational explanation to the writer lies in mechanical injury in the sudden turn done to vessels predisposed to thrombosis by long recumbent posture, a retention dressing about the hips, and recovery from a surgical procedure of moderate severity. There was no evidence of abscess in any part of the thighs. which might readily have followed septic thrombosis. This illustrates well the importance of good nursing after symphyseotomy, without which the writer's patient's complicated labor would have been far more dangerous and trying.

The patient's pelvic measurements were such that delivery, possibly with forceps, was all that was anticipated; symphyseotomy was performed for the relative indication. The case impressed upon the operator and upon the class in clinic the futility of attempting to deliver a living child by forceps without symphyseotomy, when a relative disproportion in size between head and pelvis sufficient to prevent engagement exists.

NOTE ON THE PAST AND FUTURE OF VENESECTION.

When to let blood has from the earliest days of medicine been a burning question. The Saxon Leeches were divided on it, their difficulty being the phase of the moon most suitable for the operation. Two or more centuries later, rival schools of medicine held different views as to which side the patient should be bled, some contending that the side on which the inflammation existed was the proper one for venesection; the opponents of this view of the site for bleeding adduced many and learned arguments to prove that venesection was not efficacious unless performed on the side opposite to the inflammation. All this time, however, no physician questioned the value of venesection. The first shock to the medical profession practising this time-honored custom came from a layman, Alaric Renc le Sage, who caricatured the Sagredo of Espinal by the great doctor of Valladolid, Sangrado, who informed his pupil, Gil Blas, that "other physicians make the healing art consist in the knowledge of a thousand different sciences, but I go a shorter way to work, and spare the trouble of studying pharmacy, anatomy, botany, and physic. Know, then, that all which is required is to bleed the patient copiously."

Patients appear to have enjoyed the operation. We read that Mary Anne, daughter of Don Jerome, of Quito, was bled, according to M. Guerin, five hundred times in the space of two years.

In the British Islands phlebotomists travelled the country, thatching houses, spaying sows, and bleeding. A spring and autumn venesection was considered a necessity. Young and old underwent the operation. Nor was the custom confined to this country. Italian families kept their bleeding vessels, and it was an accident of phlebotomy that gave Anel the opportunity for testing his operation for aneurism.

The operation was grossly abused for ages, and, as a consequence, the medical profession and the public became prejudiced against the lancet; it fell into disuse, and thus a useful and efficient therapeutic agent was disregarded.

We are now, however, coming to recognize that venesection has a place in practical medicine, and that the abstraction of a few ounces of blood is sometimes one of the most efficacious measures we can adopt. There is a general consensus of opinion in favor of a careful clinical study of the value of venesection.

The paper on venesection read by Dr. Pye-Smith before the Royal Medical and Surgical Society, in January, 1891, attracted much attention, and in the discussion that followed it was felt that Sir George Humphry voiced the opinion of every thoughtful member of the profession, "that bleeding was one of the most important agents in the treatment of disease." That, as stated by Dr. Pye-Smith, "the accumulation of experience would soon lead to the formation of an opinion as to the cases in which this measure was desirable," will meet with approval of the great majority of the profession at home and abroad, is noticeable from the discussions and papers on the subject appearing in foreign journals.

In the Royal Academy of Medicine in Madrid, Señor Iglesias recently made venesection the subject of a paper, which produced an animated discussion, in which Señor Palido fairly stated that not from any bad results of the operation, but from its abuse it became discredited, an opinion which re-echoes the view of the French Academy.

The operation also forms the subject of a valuable paper by Dr. Stone, in a late number of the THERAPEUTIC GAZETTE, in which, after reviewing at length the conditions which call for venesection, he concludes that he "sin-

cerely hopes that he has convinced some of his audience of the great therapeutic value of the remedy."

Sooner or later the lancet will again come to be a valued weapon in contending with inflammatory diseases.—FRY, in the *Medical Press and Circular*, July 4, 1894.

THE TREATMENT OF CERTAIN SYMPTOMS OF CROUPOUS PNEUMONIA, PARTICULARLY IN ADULTS.

ROBINSON has written an able clinical paper with this title. We append extracts from the more important passages, believing the article to be well worth careful study.

The two symptoms in connection with the first stage of croupous pneumonia which are of special interest as regards the efficacy of treatment are pyrexia and pulmonary congestion.

Personally, the writer has not thought it wise to give the modern antipyretic drugs, except in occasional doses. Of these, phenacetin is the most satisfactory. It diminishes fever somewhat and promotes sleep and the general comfort of the patient, without great risk of depression in a marked degree. Acetanilide, in doses of 2 to 3 grains, lowers temperature a degree or two, but without promoting the comfort of the patient or producing sleep. In doses of 5 grains or more it is evidently depressing. Neither of these drugs should be given continuously, and, as a rule, only when the temperature is over 103° F. Robinson relies very much more upon the use of spirits of Mindererus, citrate of potassium, and sulphate of magnesium to reduce temperature by action on the different emunctories of the economy—skin, kidneys, and bowels—than upon the former remedies. He believes still that 3 to 5 grains of quinine every four to six hours tend to diminish fever, while strengthening somewhat the heart, through diminution of local hyperæmia of the lungs, promotion of absorption of the fibrino-corpuscular exudation into the alveoli, and a possible antiseptic action on the blood itself.

As to the use of cold sponging, the ice coil, cold pack, or cool baths for the purpose of reducing temperature, he has come to the conclusion that they do not act in this manner with any special efficacy, as they are usually employed. In this country, at least, treatment of croupous pneumonia with cold baths has not yet become frequent. Occasionally, when the temperature passes beyond 104° F., and is accompanied with delirium, rapid and feeble pulse, frequent respiration, and other evidences of intense poisoning or adynamia, the tub bath at a temperature of 80° or 90° F. may be usefully employed. Not that the temperature always falls much after the use of these baths, but, combined with continuous frictions during the bath, they certainly quiet delirium, awaken latent nervous energy, and stimulate capillary circulation over the surface of the body.

While these effects are customary, according to those who have made frequent use of cold tub-baths in the treatment of croupous pneumonia, until lately the author has been very doubtful as to their beneficial action. More than once he has seen bad rather than good results follow immersion. The patient has become more cyanosed, dyspnœa more marked, and, if anything, the pulmonary congestion more intense. He is inclined to believe that sponging is a decidedly wiser method than the tub-baths in many cases, if it be combined, too, with friction to help improve the patient's condition through its combined action in lowering the temperature slightly and in increasing nervous energy.

At St. Luke's Hospital the writer has had the opportunity to observe and carefully inquire into the use of aconitine when given at this stage, and often at a later period, with respect to its action on the temperature and pulse. After many trials of this drug, he has been led to believe that its use by itself may often be injurious by diminishing the energy of cardiac contractions, so that they are with some difficulty again strengthened. Even when combined in its use with digitalin, or digitalin and strychnine, it is not free at times from grave objections. Aconite or aconitine seems to act mainly by reducing the tension of the radial pulse and lessening the number of heart-beats, while it diminishes their strength by its paralyzing effect on the ganglia and nerves controlling cardiac contractions. This poisonous effect of aconite upon the heart through its motor ganglia may be shown by direct applications of the drug. As a result of these, the heart is slowed in a very threatening manner, and may stop in diastole.

The author has never seen any drug act as well in this stage of pneumonia as small repeated doses of antimony. The salt he has given most frequently is not tartar emetic, but kermes mineral, or the oxysulphuret of antimony. He has given it in a mixture with syrup of gum and orange-flower water, usually in doses of $\frac{1}{12}$ grain every two hours, or every hour for a while; employed in this manner, fever and pulmonary congestion diminish at times in a very obvious manner. Expectora-

tion becomes easier and more abundant, and the sputa, from being very tenacious and viscid, are more fluid, and brought up with relative ease and increased frequency; thus the dyspnœa is lessened without doubt. Kermes mineral given in the way mentioned is not irritating to the digestive tract, as tartar emetic often is, even in small doses. Moreover, it does not produce a collapsed condition. It can be given as an expectorant with particular advantage in pneumonias grafted upon bronchitis, which are so frequent among old people. It suits children also remarkably well, in whom the stomach often rebels against the use of tartar emetic. To aid its advantageous effects, we should employ at times alcohol internally and revulsives to the chest-walls.

Whenever the heart is particularly taxed by reason of the pulmonary congestion and a tendency to œdema, as shown by very numerous moist râles at the bases posteriorly and more or less frothy expectoration, combined with the sanguinolent or rusty sputa, no drug produces the rapid and remarkable results of nitro-glycerin given by the mouth or, better still, hypodermically. In these instances we must not rigidly adhere to the ordinary dose of $\frac{1}{100}$ grain, but use $\frac{1}{50}$ or $\frac{1}{25}$, if the condition of the patient is imminently threatening. The tension of the pulse is by no means an invariable or true guide for the use of nitro-glycerin under these circumstances, as often, when the pulse is very frequent, depressible, and irregular, it will gain force by the use of this drug. Moreover, the cyanosis of lips, face, and upper surface of the body, together with the rapid, superficial, panting respiration, will both he favorably modified. The skin soon takes on a better color, and the breathing becomes steadier, deeper, and slower.

The use of inhalations of oxygen in relieving pulmonary congestion has afforded marked temporary relief to breathing in the greater number of cases of pneumonia. There are, however, exceptions to this rule, and in a few instances not even relief was afforded, but the dyspnœa and subjective distress was, on the contrary, obviously increased by inhalations of this gas. The cases of general œdema were those, singular to relate, in which the writer has remarked the greatest extremes. While some patients thus affected were notably relieved, others were made more anxious, and, if possible, still greater sufferers. He has not been able to account invariably for these differences of action. He has assumed, however, that whenever the pulmonary engorgement was most considerable and yet independent, apparently, of right-heart failure, the oxygen proved to be particularly serviceable. In instances in which the right heart finally gave way, and with increasing dyspnœa the accentuation of the second heart-sound over the pulmonary orifice diminished notably in intensity, while the pulse remained small, feeble, frequent, and irregular, oxygen has not proved itself so important an agent for good, and yet some writers find "that when the condition is mainly one of cardiac failure and collapse, particular benefit is obtained."

The proper use of alcohol in the treatment of pneumonia is one of the most difficult questions with which we have to do. Unquestionably, in many instances it is very beneficial, and for different reasons. Putting aside its direct stimulating properties, it must be regarded as a very acceptable food in moderate amount. It is readily assimilable and easily oxidized. Moreover, it prevents tissue waste and diminishes the amount of carbon dioxide, thus helping respiration when this function is particularly embarrassed. Alcohol is a notable relaxer of vessels, and the capillary circulation is thus materially improved and relief afforded after this manner to a laboring heart and engorged vessels in the different internal viscera,—lungs, liver, spleen, and kidneys.

Finally, alcohol gives nerve force, thus controlling adynamia, restlessness, wakefulness, and delirium, particularly when all these symptoms are but the index of the intense general poisoning of the system in pneumonia. It seems, therefore, that it is generally judicious practice, when any reasonable doubt prevails as to the condition of the patient with respect to any one of the numerous conditions which seem threatening to life, to give repeated and moderated doses of alcohol. I know of only two absolute counter-indications:

1. Cases in which the patient is already highly plethoric, and where the mass of blood —rich, apparently, in all nutritive qualities— would merely have this state exaggerated, as it were, by alcohol, which is so readily and rapidly assimilated, and thus becomes positively a hinderance to the vital function.

2. Cases in which the hepatic engorgement and gastric catarrh render the use of alcohol pernicious, because nausea and stomachal intolerance are increased by its exhibition even in moderate amount, and thus assimilation of food and water is prevented.

In just such cases do we give most evident relief with repeated doses of calomel, small or moderate in amount, which arrest fermentative processes in the stomach and intestinal tract

and free the portal circulation in the most evident manner. An engorged and sometimes tender liver, a hard and distended abdomen, are frequently dissipated by this medication. In this way notable relief is afforded both to the respiration and circulation, and not seldom the temperature will drop a degree or two after one or two free movements of the bowels. The author does not refer to the use of calomel when the patient is first placed under treatment by the physician, but rather to cases in which treatment has continued for two or more days after the initial chill, and where the tongue remains yellow and thickly coated with fur, while the breath is most offensive. Such an example was observed by the writer only a short time since, and the importance of watching and treating intelligently such conditions, when they are clearly present, cannot be urged too strongly.

How is heart-failure to be met? The author's convictions are formally opposed to the use of digitalis or digitalin, except in very small doses, and then only to control cardiac irregularity when it occurs. He feels confident, however, that it is based upon correct interpretation of pathological facts as they are offered to us. Digitalis, if it acts at all in any appreciable manner, must of necessity increase the power of the heart at the same time that it narrows and closes up, so to speak, the circulation in small vessels. Now, in instances in which passive congestion is already a great danger, this effect is precisely what we should most wish to avoid. Nor does he believe that this unfortunate effect can be properly prevented by the relaxing effects of aconite or aconitine on the peripheral circulation, particularly under the conditions now referred to. It is true that he has never seen death ensue directly from the action of this drug at this time. He has known, however, the pulse to be lowered in a sudden and alarming manner, and it was necessary on more than one occasion to interrupt its use immediately, and to stimulate the patient freely according to every available method, so as to restore failing strength to a semi-paralyzed heart, and even slight tension to the radial pulse.

On several occasions already, when a patient's condition has seemed desperate, and after strychnine to the highest possible limit compatible with safety has been vainly employed, he has had at least temporary results of considerable value from the use of hypodermic injections of extract of coca, made up aseptically. He is of opinion, however, that we must rely also in these cases upon the use of nitro-glycerin hypodermically in sufficient doses to restore the patient to a relatively good condition. These hypodermic injections, alternated with those of strychnine, will do what no other drugs, in his experience, accomplished. The basis of the use of nitro-glycerin is, as we all know, to bleed, so to speak, from the veins into the arteries, and thus allow the wearied and laboring heart to have the opportunity to tide over a critical period, where saving its energy is of as much, if not more, importance as are our efforts to add to it.

In just such cases bleeding was formerly employed with at least the happiest temporary effects, and it is probable that, except for this seemingly heroic measure, many lives would have been inevitably lost. Bleeding was the only means in those days which would act efficiently and rapidly, and if relief were not thus afforded to the acute and grievously obstructed pulmonary circulation, the patient fell suddenly into collapse and died. Let us not ignore the fact that these cases still occur, and, in the writer's judgment, must be treated still in this manner. Only one means will save them, and this means is bleeding. Such cases, in general, are those which are evidently sthenic in character and where the inflammatory lesion seems most marked from the beginning; those cases in which, after twenty-four or forty-eight hours, both lungs are so much congested from venous paralysis and insufficient heart-power that drugs can have—do have—no visible effect, unless we take away an abundant amount of blood by venesection. Of course, in such instances, if the patient is an alcoholic, we are greatly handicapped by reason of probable degeneration of heart, kidneys, and arteries; but we cannot be confident invariably to what extent this degeneration has gone, and we are frequently in the position of offering a man practically his last and only chance of survival.

Immediately after the bloodletting we may be able to use nitro-glycerin, strychnine, or caffeine hypodermically with the greatest benefit. Frequently, of course, we shall be grievously disappointed as to the result, and our patient will die speedily, despite all our efforts to save him. Even though the kidneys are apparently in good condition and there is no albuminuria, these sudden fatal occurrences take place. In such instances, at times, temporary benefit results from venesection, and we hope and believe for a few hours that the patient's condition has been really helped. Soon a change comes for the worse, and death may follow within a few hours.—*New York Medical Journal*, August 25, 1894.

TREATMENT OF THE EXANTHEMATA.

ARMSTRONG, in the *Medical Magazine* for August, 1894, thus concludes a study of this subject,—

1. That antiseptic inunction does not exert any specific power over infectious diseases.

2. That it has but little, if any, power in preventing the spread of infection.

3. That cases treated thus are more subject to complications.

MECHANO-THERAPY IN CHRONIC DISEASES OF THE HEART.

In the *Practitioner* for August, 1894, ECCLES writes an article on this subject. He believes the rationale of the treatment of certain chronic diseases of the heart, by a combination of rest, massage, assisted and resisted exercise, followed by out-door walking carefully graduated, is based upon,—

1. The rest afforded to the overstrained or enfeebled heart by the adoption of the recumbent position for a time.

2. The aid given to the circulation by the mechanical centripetal pressure exercised on the limbs and trunks by massage.

3. The more rapid oxygenation induced by the acceleration of the circulation, and the diminution of peripheral resistance by the same means.

4. The improvement in general nutrition, the elimination of waste products, and the increased metabolism induced by the passive and active exercises in and out of doors.

5. The careful preparation and selection of suitable food, coupled with the aid to digestion afforded by abdominal massage and exercises acting directly on the walls of the abdomen, and exercising pressure on its contents.

6. The substitution of regular, graduated, assisted, and resisted movements for the spasmodic and ill-regulated exercise taken by patients suffering from cardiac functional disturbance, with or without organic lesion.

TREATMENT OF WHOOPING-COUGH.

CARMICHAEL speaks of the treatment of whooping-cough as follows, in his article in the *British Medical Journal* of August 25, 1894. He states that we must bear in mind that we are dealing with a zymotic disease running a certain course. Our efforts must be to guide the patient as safely as possible through the various stages and avert complications. To this end the child should be kept in a well-ventilated room of mean temperature. As to whether it is desirable or necessary to keep the child in bed in uncomplicated cases during the premonitory stage and height of the disease, practice seems to vary infinitely. In the author's opinion, we must be guided by the season of the year and the general condition of the patient. It cannot be doubted that it is the side of safety to keep the patient confined to bed until the disease begins to decline. It is more likely to be cut short in this way, and it is easier to carry out the treatment by inhalants and otherwise, and to avoid the risk of complications.

There are few diseases that have been so much, so variously, and so unsatisfactorily drugged as this, a tolerably certain indication of the powerlessness of any of the remedies to arrest or cut short the disease. As in all other diseases, each case must be dealt with on its own merits; the patient must be treated as well as the disease. In the prodromal and early convulsive stage, alkaline diaphoretic mixtures with mild counter-irritant and sedative liniments to the chest seem to be indicated. When the paroxysmal stage is developed, respiratory sedatives are of decided service, of which opium, belladonna, and antipyrin may be taken as types. In the stage of decline, to restore nutrition, quinine, alum, and sometimes ferruginous preparations of the milder kind are serviceable; later on, cod-liver oil, in one form or another, is undoubtedly of great value. As to local treatment of the mucous surface by spray, inhalants, etc., the writer is in the habit of prescribing these from the very first, or to the decline of the convulsive stage, and in his hands if any method of treatment helps to cut short the disease it is this. Douching of the nostrils should be systematically carried out several times a day with dilute solution of perchloride of mercury or boracic acid; the atmosphere of the room should be impregnated with volatile antiseptic vapors. Those in which carbolic acid is the basis are the most useful, such as creoline or cresoline, or carbolic acid itself. Eucalyptus, benzol, and thymol are also useful. The most thorough way of allowing the child to breathe an antiseptic atmosphere is to let it sleep in a tent into which the vapor is introduced continuously.

Diet he considers of great importance. It should be light, nourishing, and digestible, and not given in too large quantities; sweets, fruits, and farinaceous foods should be largely excluded.

VALUE OF DIRECT MASSAGE OF THE CORNEA AS AN AGENT IN THE TREATMENT OF CORNEAL OPACITIES.

The subject is discussed by MORTON in the *Medical News* of September 1, 1894. The cornea is rendered insensitive by a ten-per-cent. solution of cocaine, which, at the same time, by its action upon the corneal epithelium, facilitates the entrance of the drug used. The head of the patient resting upon the knee of the surgeon, the eyelids are separated with the thumb and forefinger of the left hand and the massage-spoon is held in the right. The cornea is gently rubbed alternately in a circular and radiating manner from one to three minutes, and this is repeated as often as is indicated in the individual case. It is to be remembered that the uvea, or region just external to the corneal limbus, nourishes the cornea, the lens, and the vitreous, and is the great lymph-producer for the eye, particularly the anterior segment. For this reason the author desires to lay stress upon the fact that these movements should not be confined to the area immediately adjacent to the opacity, but should be applied, not only all over the cornea, but also in the ciliary zone upon sclera.

After the massage has been practised, he kneads the globe with the thumbs of his two hands, carefully but thoroughly. By following out this plan the lymph-channels are thoroughly opened and the activity of the lymph-currents increased. This in itself is not only a means of dissipating the opacity, but allows the medicament used an excellent chance for action. In massage through the lids, as spoken of by various authors, it is impossible to obtain the effect in a satisfactory manner, and for two principal reasons: in the first place, the manner of applying massage through the lids to the cornea, or any portion of the anterior ocular segment, is a "blind" one. It is impossible for the operator to tell at just what point he is applying the massage. Again, the method is indirect, and cannot be as efficacious as when the massage-spoon is employed. This instrument the writer devised about a year and a half ago, and he has used it continuously in suitable cases since. It is so arranged that the cornea is thrown into very small furrows, and it will also be noticed that any ointment used is held nicely between the forks, and can thus be "worked into" the cornea during the massage. He has found this form of treatment of value in the deep forms of scleritis when used with the ointment of yellow mercurous oxide, and he has used it in the infiltration constituting interstitial keratitis, but he is not yet ready to speak with any authority as to the result.

In pannus this procedure has been partially efficient, and in one case vision was recovered to a remarkable degree. It must be borne in mind that this treatment is adjuvant simply, without any marvellous power; that it is rational in its action must be obvious; that it has yielded satisfactory aid in the treatment of corneal opacities in his practice he is sure.

In opacities following non-inflammatory conditions of the cornea it is of little avail, for here we have to deal with very different conditions. He is confident that it is far superior to massage through the lids; and the protection rendered the lens by the aqueous humor, and the necessary skill of the operator, make the danger of injury to the lens very slight indeed.

PILOCARPINE IN THE TREATMENT OF ACUTE AND CHRONIC URTICARIA.

In the course of an article in the *Medical Record* of September 15, 1894, ABRAHAMS points out that the employment of pilocarpine in the treatment of urticaria is not entirely new, nor yet is it very old. The latest works on skin-diseases and materia medica, so far as the writer could ascertain, hardly mention it. His first lesson in this new application of the drug he learned in Dr. Lustgarten's skin clinic, with which he was connected as assistant for nearly three years. The drug is used there freely and satisfactorily, and on more than one occasion Dr. Lustgarten, in private conversation, extolled the virtues of pilocarpine in the disease in question. It must be recognized, however, that this medicinal agent failed to be of service in the hands of some good men, even skin specialists. The failure is probably due to one of three causes: either the urticaria was badly complicated by eczema, the results of scratching or strong applications, or the diagnosis was questionable, or the alkaloid was impure. A case in point is given. After relating his excellent results with pilocarpine in urticaria to an able physician, he promised to furnish the reporter with corroborative evidence from his extensive practice. A few days later he returned with evidence—of disappointment. At the writer's request he was shown the patient, and found the fair dame a victim of a mild scabies instead of hives.

Now, as to the mode of administration and dosage. An adult should get it under the skin, and a child by mouth. The dose for an adult is from $\frac{1}{6}$ to $\frac{1}{2}$ grain, repeated every day or

every other day, or oftener. For a child one year old, the dose is from $\frac{1}{20}$ to $\frac{1}{8}$ grain in distilled water every evening at bedtime; for a child from two to three years old, the dose is from $\frac{1}{15}$ to $\frac{1}{6}$ grain [!!—Ed.]. By administering the alkaloid gradually—feeling one's way, as it were—no untoward accident should be anticipated. Adults, however, seem to be more susceptible to its influence than children. A good precaution is to remain with the patient from fifteen to twenty minutes after exhibiting the medicine, and when given to children, mothers should be instructed to use a little red wine or claret should the child show signs of weakness. He has seen only one man that complained of marked weakness after a hypodermic injection, and two patients were severely salivated. The first was restored by a little claret, and the other two were relieved by holding ice in the mouth.

It seems that in order for pilocarpine to be palliative or curative in acute or chronic urticaria, it must make the patient sweat freely. Free perspiration is promptly produced in an adult, and with a comparatively smaller dose than in a child, and herein is the guide to increase or diminish the dose.

To sum up:

1. Pilocarpine in urticaria is the drug *par excellence*.
2. Be sure of the diagnosis.
3. Before instituting your treatment, clear off complicating lesions.
4. Get a pure drug.
5. Have patience.
6. Push the drug to the point of tolerance.

In two cases of jaundice where the itching was quite annoying, pilocarpine proved useful; it also allays the burning and tingling sensations in other affections of the skin.

TREATMENT OF CYSTITIS IN WOMEN.

While in men the cause of cystitis is nearly always due to prostatic or urethral affections, in women it is due to inflammation following labor or operative traumatism. It may be acute or it may be chronic, and the following formulæ proposed by Lutaud (*Revue Obstetricale et Gynécologique*, August, 1894) may be found useful in the acute form:

Morph. muriat., gr. ⅙;
Extract. hyoscyamus, gr. ½;
Coca butter, gr. xlv.
For one suppository; 3 or 4 in twenty-four hours.

Irrigations of laudanum are soothing.

For the insomnia, chloral given as an injection:

Chloral hydrate, ʒi;
Yellow of one egg;
Water or milk, fʒiiss.

The hypodermic injection of morphine (the patient never being permitted to make the injection herself) is still the best means of calming the paroxysms of pain. Cataplasms, baths, and hypogastric fomentations are useful. Topical applications in the vagina assist in allaying inflammation about the neck of the bladder:

Camphorated lanolin, ʒii;
Extract of belladonnæ, ʒi.

Saturate a tampon with the above and introduce night and morning into the vagina.

When the pain is intense, apply in the same way—

Muriate of cocaine, gr. xv;
Distilled water, fʒvi.

Internally, for the acute form:

Oxalic acid, gr. viii;
Distilled water, fʒiii;
Syrup bitter orange-peel, fʒi.
A dessertspoonful every four hours.

Chronic Cystitis.—Here the general as well as the local treatment should be employed, and only when the inflammatory phenomena and pain have subsided should one commence the irrigations.

The mild antiseptics hold first rank, as—

Boric acid, ʒi;
Sodium biborate, ʒiss;
Distilled water, Oii.
ʒi to ʒii are injected rapidly and allowed to flow away.

If the bladder is still irritable, use smaller amounts.

Injections of silver nitrate are but rarely employed; instead, iodoform is preferred, especially in cystitis of gonorrhœal origin.

In such cases an injection of the boric-acid solution above mentioned is given; then follows an injection of 5 ounces of tepid water, containing a coffeespoonful of the following emulsion:

Iodoform powder, 30 parts;
Glycerin, 40 parts;
Distilled water, 20 parts;
Gum tragacanth, .25 part.

Pyoktanin is also recommended in gonorrhœal cystitis, in the proportion of,—

Pyoktanin, gr. xv;
Boiled and distilled water, Oii.
Inject morning and evening for from ten to fifteen days.

Constitutionally, in gonorrhœal cystitis, extract of pichi was proposed by Wyman, and is thus employed:

Extract of pichi, 10 parts;
Tr. cannabis indica, 2 parts;
Lime-water, 90 parts.
A dessertspoonful every four hours.

Or the following may be employed:

Bromide of ammonium, 10 parts;
Tr. hyoscyamus, 5 parts;
Fluid extract buchu, 10 parts;
Distilled water, 60 parts.
A coffeespoonful every four hours.

If there is pus in the urine, the following is useful:

Benzoic acid, 1 part;
Orange-flower water, 50 parts;
Boiled water, 900 parts;
Sugar, 100 parts.
Take by the glass between meals.

ICHTHYOL-ZINC PASTE AS A TREATMENT FOR ECZEMA OF THE FEMALE GENITALS.

In an article on eczema of the mucous membranes, VON SEHLEN (*Monatshefte für Praktische Dermatologie*, July, 1894) says that the inside of the vaginal sheath is especially subject to eczema, which continues outward to the labia, causing excessive itching. For the relief of this condition he proposes the following:

Ichthyol ammon., 1½ to 2 parts;
Amyli tritici,
Zinc flor, of each, 12 parts;
Vaseline, 25 parts.
M. et fiat pasta.
Sig.—Zinc-ichthyol paste.

Also calomel ointment of a high per cent. will often be useful in preventing the intense itching.

TREATMENT OF FURUNCULOSIS.

W. VAN HOORN (*Monatshefte für Praktische Dermatologie*, July, 1894) for many years has used the following method in cases of multiple furuncles, based upon general disinfection of the skin and isolation and disinfection of the affected area.

A general bath in warm water and soft soap is given; then the furuncles and the region about them are washed with a 1 to 1000 sublimate solution, dried with wadding (Bruns), and over the furuncle is applied a mercury-carbol mull plaster, after which the patient puts on a fresh suit of underclothing. Each day, or twice a day, the plaster is renewed; any soft points or perforations are lightly pressed, and contents washed away with the sublimate solution. If there is no fluctuation, the infiltrate is rapidly reabsorbed; but if fluctuation is clear, perforation is the rule, but the healing is much hastened.

What is of especial importance is the non-appearance of new groups of furuncles, and when a single one now and then does break out, it is quickly reabsorbed.

TREATMENT OF PUERPERAL INFECTION.

BONNAIRE thus treats puerperal infection (*La Tribune Médicale*, July, 1894).

In all manipulations before, during, and after labor, scrupulously cleanse everything, from hands and instruments to bedlinen, that in any way may come in contact with the genitals of the patient.

Those who claim that the cause is always hetero-infection rely upon asepsis alone, but those who claim that the source of the microbes may be both hetero- and auto-infection rely upon antisepsis.

The author believes with others that auto-infection may be occasioned by the streptococcus, staphylococcus, gonococcus, or the colon bacillus, etc., and for that reason proposes antisepsis.

To avoid the entrance of the microbes, and their destruction when present after labor, a very feeble stream should be used in washing out the vagina, and the olive-tipped glass instrument used for the injections should be perforated only on the side.

Great care should be exercised that the canula contains no air, and from 3 to 4 quarts of a solution of sublimate (1 to 10,000) should be injected.

Carbolic acid is also a good antiseptic to use in these cases, in strength of at least two-per-cent. solutions.

Sulphate of copper is also a good drug, but possesses the same danger as the carbolic, in that they may both cause rapid poisoning when absorbed.

Bonnaire especially recommends the iodide and permanganate of potassium, iodoform, and phenosalyl. The following is an excellent way of using iodine:

℞ Iodide of potassium, ʒiss;
Metallic iodine, ♏xlv;
Water, f℥iii.
Mix the whole in a quart of water.

Potassium permanganate is a good disinfectant, but less energetic than iodine.

Phenosalyl in solutions of one per cent. is more active than phenol at five per cent.

Iodoform increases diapedesis, and is an excellent antiseptic to living tissues.

As for boric acid, he considers it dangerous, not because it is toxic, but because it offers no resistance to microbes.

Finally, in a case of puerperal metritis, commence by washing the vagina with sublimate; then irrigate the uterus with permanganate, 1 to 1000. If, in a few hours, the temperature does not commence to subside, then inject into the uterine cavity the solution of iodine.

If there are false membranes, or if the irrigation does not suffice to remove the source of infection, then cleanse by friction, or, finally, curette the uterine cavity.

When swabbing is resorted to, impregnate the substance used with zinc chloride, iodine, or carbolic, five to ten per cent.

After curetting, wipe out the uterine cavity with a solution of carbolized glycerin, ten per cent; creosote and glycerin, one to three per cent., or chloride of zinc, ten per cent., and tampon the vagina with iodoform gauze, either dry or saturated with one of the foregoing solutions.

General Treatment.—There is usually a diarrhœa very offensive in odor and with large stools. To remedy this, some form of intestinal antiseptic will be sufficient,—benzonaphtol, naphtol, salol, salicylate of bismuth.

Increase diuresis by a milk diet; excite the skin to increased action by frictions or by baths. In cases of high fever with delirium, cold baths will give good results.

To act directly upon the germs and their products in the blood, mercury is a great auxiliary. The best form is calomel; by its action upon the liver it increases the microbicidal power and also disinfects the intestines. Give the first day 7 grains at a dose and repeat four hours afterwards, followed the next day with small doses (¾ grain) every two hours.

Alcohol and quinine sulphate may also be added to this list, supplemented by milk, bouillon, eggs, peptones, and coffee.

Also in the line of rendering the blood more resistant to microbic influence, the subcutaneous injection of the serum of Hayem, in two injections daily of ten fluidrachms each, will often produce the greatest tonic influence. Below is appended the formula for the serum of Hayem:

℞ Sodii chloridi, ʒiss;
Sodii sulph., ʒiiss;
Aquæ, Oii.

TREATMENT OF SOME FREQUENT MALADIES OF CHILDREN.

Anæmia.—First, attention should be paid to hygiene and to regular feeding with nourishing and easily assimilable foods. Correct all intestinal disturbances. Before each feeding administer the syrup of the iodide of iron for fifteen days, followed for the next fifteen days by Fowler's solution, commencing with ½ drop for a child of two years.

From time to time suspend this treatment for a week and give—

Syrup of rhubarb,
Syrup of gentian, of each, fʒiv.
Dessertspoonful for each dose.

Or of the following:

Tr. nux vomica, ♏xv;
Tr. anise,
Tr. gentian,
Tr. cascarilla,
Tr. colombo, of each, fʒi, ♏xv.
Dose.—From 5 to 10 drops.

If there is indigestion, administer after meals a small glass of this lemonade:

Acid hydrochloric, ♏xv;
Syrup of lemon, fʒiii;
Distilled water, Oi.

If there are symptoms of rachitis, phosphated milk, phosphate of lime, or acid phosphate of lime in milk may be added to the above regimen, while stronger feeding also may be resorted to.

For anæmia with scrofulosis, cod-liver oil in winter and syrup of the iodides in summer should be administered.

Syrup of the iodide of iron may be alternated with Fowler's solution at the same time that the oil is being given.

If there are symptoms of tuberculosis, to the foregoing treatment add this plan:

Upon a plate pour a mixture of—

Tar, ʒiiss;
Creosote, ʒiii to ʒvi,

and place over a night-lamp burning throughout the night in the sleeping-room of the infant.

Anæmia of Syphilitics.—To the new-born give frequent small doses of mercury, and increase the dose; if the child is too feeble the medicine can be given by inunctions.

For anæmia following malaria, administer wine of cinchona in doses from a coffeespoonful to a soupspoonful before meals for fifteen days; then for the next fifteen days Fowler's solution, 1 to 3 drops.

In hæmophilia or anæmia from loss of blood, for the first few hours 1 to 2 drops of perchloride of iron every two hours, then three or four times a day.

For constipation at weaning-time, injections and glycerin suppositories, and before meals a spoonful of—

Syrup of rhubarb,
Syrup of gentian, of each, equal parts.

Or give every morning a coffeespoonful of—

Olei ricini,
Syrup of orange-flowers, of each, f℥ss.

Also, in the same dose,—

Calcined magnesia,
Sulphur, sublimed,
Cream of tartar, of each, ʒi;
Essence of anise, ♏iiss.

When the liver is sluggish, in the morning, once or twice a week, give the following in cachet, or in honey, or sugar water:

Calomel,
Scammony, of each, gr. iii. to gr. v.

For a purgative:

Boiling water, f℥iii;
Manna in tears, f℥i;
Senna leaves, ʒi;
Powder of parched coffee, ʒiiss.
Strain, and take during the day.

With atony of the intestines:

Tr. nux vomica, fʒss;
Tr. belladonna,
Tr. anise,
Tr. cascara, of each, fʒiiss.
Given in water (8 to 12 drops) before meals.

For biliary calculus in infants, in the intervals, bicarbonate of sodium in grain doses for ten days. The following ten days,—

Syrup of ether,
Syrup of turpentine, of each, f℥iii.
A dessertspoonful before meals.

Twice a week add to the above a coffeespoonful of—

Sulphur, sublimated,
Cream of tartar,
Magnesia, of each, ʒv;
Essence of anise, ♏xv.
Before meals.

The following table of foods may prove useful:

Foods permitted.—Milk, cream, and fresh cheese; soups; eggs; all meats in small quantities, especially chicken; legumes, well cooked and when green; potatoes; dried fruits, preferably cooked; marmalades and jams; cooked fish; bread in small quantity; alkaline waters.

Foods not permitted.—Butter and fats, old cheese, pork, mushrooms and truffles, pastries and sweetmeats, dried legumes, sausages, asparagus and tomatoes, liquors, coffee, wines, and strong beers.

For Nephritic Colic.—Hot baths, afterwards blisters, hot poultices, or hot fomentations or stupes applied over the renal region; then administer every half-hour a dessertspoonful of the following mixture:

Antipyrin, gr. viii. to gr. xv;
Chloroform water, f℥i;
Lime-water, f℥ii;
Syrup of ether,
Syrup of belladonnæ, of each, f℥iiss;
Syrup of orange-flowers, f℥iiss.

If this is vomited, then give morphine hypodermically.—E. PÉRIER (*Revue Obstet. et Gynécol.*, August, 1894).

THE INFLUENCE OF THE ABORTIVE TREATMENT OF SYPHILIS ON THE NERVOUS SYSTEM.

DEUTSCH (*Archiv f. Dermatologie u. Syph.*, Bd. xxviii., Heft 2, 3, 1894) calls attention to the fact that symptoms of involvement of the nervous system are often among the first of those which show that syphilis has become a constitutional disease. Thus, among the prodromata, pain in the head, kidneys, psychical disturbances, pallor, and nausea are well recognized, and are attributed by Lang to meningeal irritation. Occasionally sluggishness or inequality of the pupils is noticed, neuralgia, greediness, excessive thirst or drenching sweats, all these signs denoting irritation of the brain and its meninges. A similar condition of the spinal cord and its envelopes is indicated in the prodromal and exanthematous period by very marked increase in the reflex excitability of the skin and tendons, followed by a rapid diminution, sometimes amounting to complete absence, which may last for several weeks after the exanthemata have disappeared. All these signs show early involvement of the nervous system, and suggest the advisability of attacking the poison at the earliest possible moment and weakening its virulence. As a matter of personal experience, Deutsch states that in patients who were treated with mercury early,—that is, immediately after the appearance of the chancre, or at least before the development of

secondaries,—symptoms denoting involvement of the nervous system did not develop; whilst in those not treated until secondaries were well marked, such symptoms were the rule. Moreover, so far as tertiary manifestations are concerned, these did not attack the nervous system in cases which received early treatment.

VICARIOUS MENSTRUATION.

FRICK (*Kansas City Medical Index*, No. 178, p. 306), after touching on the literature of this subject, reports a fatal case of hemorrhages from the stomach, occurring at the menstrual period, which pointed strongly to vicarious menstruation. However, autopsy revealed a small red spot on the anterior surface of the stomach about an inch from the cardiac orifice, near the smaller curvature. This marked the site of a small ulcer which had perforated the walls of the stomach to the peritoneal coat. The veins were varicose and there were numerous capillary ulcers. Further search revealed kidney-disease,—one of the large variety, the other mottled.

He finally concludes that whenever a hemorrhage occurs, even though it be at the menstrual period, we should not be satisfied with merely calling it a vicarious blood-flow, but consider that there is a diseased condition of the organ from whence the blood flows.

If that organ be the stomach, we should, if possible, ascertain if that diseased condition is simply a stomach affection or due to the liver, kidneys, or some other organ.

PHYSIOLOGICAL REST IN THE TREATMENT OF PROLAPSE OF THE RECTUM.

BRYANT (*Mathews's Medical Quarterly*, vol. i., No. 4) reports the case of a man operated on seven times for the relief of extensive prolapse of the anus, with its attendant distressing symptoms. Until the last operation, surgical intervention had been of little benefit. Bryant, to whom he finally came, made an artificial anus in the left groin, putting the patient to bed for two weeks, meaning to proceed to further treatment. But this operation was followed by so much relief and by such a marked diminution in the pressure that he was content to adopt no further procedure. He submits the following propositions as a conclusion to his paper:

That the proper performance of the physiological functions of the rectum contributes greatly to the advançement of rectal disease and to the sufferings of the afflicted.

That the complete vicarious discharge of the fæces through an artificial anus located in the sigmoid flexure reduces the physiological demands on each structure of the rectum to a minimum.

That the lessening of the physiological requirements is commonly in direct proportion to the diminution of the fæcal flow through the rectum.

That the cessation or lessening of the fæcal discharge per rectum exercises a palliative and curative influence on diseases of the rectum.

That in certain cases of obstinate rectal prolapse the formation of a vicarious channel for fæcal discharge is justifiable, both as a palliative and curative measure.

That the preliminary establishment of such a channel for the purposes of cleanliness and the prevention of infection is justifiable in many grave operations for prolapse of the rectum.

That the dangers attendant on the formation of an inguinal anus are much less than those invited by the contact of fæcal discharges with large operative surfaces of the rectum.

That the case just presented has been, without special risk, greatly benefited, and may be finally cured, through the agency of an artificial anus.

That when cure takes place, great care must be exercised thereafter, otherwise the prolapse will return.

TECHNIQUE AND INDICATIONS OF VAGINO-FIXATION.

VINEBERG (*New York Medical Journal*, October 27, 1894) gives the technique of Mackenrodt's operation as follows:

The patient is prepared as she would be for a vaginal hysterectomy. Before proceeding to the operation proper, the uterus is curetted and washed out with sterilized warm water, the laceration of the cervix is repaired, the cervix is then grasped by two volsellæ and drawn downward and outward as far as possible without doing violence. The anterior vaginal wall is caught by another volsella, at a point from one to two centimetres below the urethral opening, and drawn upward. In this way the vaginal wall is put on the stretch. At this stage it is well to pass a sound into the bladder to ascertain the extent to which the bladder is attached to the cervix and to estimate the thickness of the vaginal wall. With a sharp convex-bladed knife a longitudinal incision is made in the median line through the anterior

vaginal wall, extending from one to two centimetres below the urethral opening to the vaginal attachment of the cervix. The two flaps thus made are separated from the underlying bladder by partly sharp and partly blunt dissections. In virgins and nulliparæ the attachment of the vaginal wall to the bladder is very firm, and this part of the operation may be attended with some difficulty and quite free hemorrhage, which can, however, be readily arrested. In dissecting the flaps their width is made to depend upon the degree of the prolapsus or relaxation of the anterior vaginal wall. The rationale of this will be seen later. The flaps are made wider near the cervix, and gradually taper towards the upper angle of the incision near the urethral opening. The dissection is thus carried out in the form of a triangle, with the base near the cervix and the apex near the urethral opening.

The two flaps are now held apart by tenacula at the lower angle of the wound and a transverse, slightly curved incision upon the cervical tissue. This incision is made in the already denuded surface and cuts through the septum binding the bladder to the cervix. It is a wise precaution before making the transverse incision to again ascertain the lower border of the bladder by passing a sound into it, so as to avoid cutting into this important structure. The bladder is now gently pushed up from the cervix and wall of the uterus with the palmar surface of the index finger, as is done in vaginal hysterectomy. In some cases, to facilitate this step, it may be necessary to nip with the scissors the attachment of the bladder to the broad ligaments at either side. As in the preceding step, the ease or difficulty of execution of this part of the operation will in a great measure depend upon whether the patient is a nullipara or multipara. It is essential to make a good, free separation of the bladder from the uterus, and not to worry whether the peritoneal duplications passing over the base of the bladder to the anterior surface of the uterus be torn through or not. We now have the bladder in the upper triangle of the wound, behind the pubes, where it can be retained by a vaginal depressor, if necessary,—a free cavity known as the vesico-uterine space and the denuded cervix.

In the majority of cases of retroflexions there is a prolapsus of the anterior vaginal wall. Even when there is no prolapsus, there is usually relaxation to a lesser or greater degree. Consequently, in nearly all cases an anterior colporrhaphy is indicated. In vaginofixation this serves two purposes:

1. To restore the width of the canal to its original dimensions.

2. To form a better fixed point for the fixation of the uterus.

The colporrhaphy is now easily carried out by resecting a corresponding strip of tissue from either vaginal flap. The next step of the operation consists in anteverting the uterus with a properly constructed sound, so that its body presents in the vaginal wound. It is of importance to have the right kind of a sound. In some cases the uterus is readily anteverted; in others, again, considerable difficulty is experienced, owing to the small arc through which the sound can pass on account of a high and rigid perineum; hence the value of the curve at the lower end of the sound. In virgins and nulliparæ it might be necessary to incise the perineum so as to gain more room. Having got the uterus well forward and presenting in the vaginal incision, we next proceed to suture it to the vaginal wall. With a moderately stout curved needle a silk suture is passed through the left vaginal flap at the extreme upper end of the incision,—that is, from one to two centimetres below the urethral opening and about half a centimetre from the edge of the flap. The suture is then carried through the anterior wall of the uterus, as near the fundus as possible, and out through the right flap at a corresponding point to that of the opposite side. A second suture is passed in the same way about a centimetre below the first. The sutures are now tied and the vaginal wound is closed by a continuous catgut suture, the last one or two stitches being made to catch up the cervical tissue to avoid any pocketing. A couple of interrupted sutures may be passed to strengthen the line of coaptation, particularly if any tension exists. Should there be a prolapsus of the posterior vaginal wall or a laceration of the perineum, this is now attended to. The vagina is packed lightly with iodoform gauze and the patient put to bed for three weeks, the uterine sutures being removed at the end of the fifth or sixth week.

For the first few days the patient has to be catheterized. The duration of time during which catheterization has to be employed has varied in the writer's cases from a few hours to five or six days. In the majority of cases the patients have been able to void urine after the first movement of the bowels,—from twenty-four to thirty-six hours after the operation. The operation is a perfectly safe one; its mortality thus far is *nil*. This statement is based on two hundred and twenty-four recorded cases, including the writer's seventeen cases.

The following conclusions seem warranted:

1. Vagino-fixation is a safe operation.

2. It is not particularly difficult to perform.

3. The only special instrument required is a uterine sound of the proper shape and size.

4. The operation is indicated in mobile retroversions or retroflexions of the uterus that are attended with symptoms, and which, for one reason or another, are unsuited for treatment by pessaries or tampons.

5. It is not attended with any untoward sequelæ.

6. It fixes the uterus in a position closely resembling that of the normal.

7. The results of the operation, of course, interfere in no way with the occurrence of gestation.

OPERATION FOR REMOVAL OF ENLARGED CERVICAL GLANDS.

DOLLINGER (*Centralbl. f. Chir.*, No. 36, 1894) described an operation for the subcutaneous extirpation of tuberculous lymph-glands in the neck and submaxillary region. The posterior half of the scalp having been shaved, and the whole of the scalp and the skin of the affected side of the neck carefully disinfected, an incision is made, commencing behind the external ear, and carried in a curved line with the convexity backward and downward towards the middle line of the neck behind. The skin and superficial fascia are divided, and the anterior and lower flap is undermined by finger and elevator until the enlarged glands are reached; these, if they have not broken down or contracted firm adhesions with surrounding soft parts, may now be readily detached by the elevator and drawn through the wound. The skin forming the lower flap is so yielding, especially in women and children, that it is possible by this operation, the author asserts, to reach glands situated near the chin, and even those in the supraclavicular region. The wound, when made under strict antiseptic precautions, heals quickly, and the scar is hidden by the new growth of hair.—*British Medical Journal*, October 6, 1894.

TREATMENT OF POTT'S DISEASE.

An interesting and valuable paper on the above subject by PHELPS appears in the *Journal of the American Medical Association* for October 27, 1894, in which the following treatment is advised:

In lateral curvature of the spine, effort should be made to develop the muscles of the back by massage and proper gymnastic exercises. The general condition is improved by appropriate food and exercise; and in cases where deviation of the spine amounts to more than half the diameter of the vertebra, a support to prevent absorption of the vertebra at point of curvature is imperatively demanded. In Pott's disease of the spine, however, the principle of treatment is the reverse; it consists in absolute immobilization and extension to the point of comfort to relieve the pressure between the diseased vertebræ.

The plaster-of-Paris corset, or the wood corset with lacings, so that it can be removed at night, are the best forms of brace devised. Aluminum corsets are excellent but expensive. In muscular forms of curvature, corsets with steel stiffening, particularly for young girls, are very satisfactory. These appliances are made while the patient is suspended to the greatest amount possible. This relieves pressure upon the bodies of the vertebræ and stops absorption. The corsets are removed at night, extension being obtained in the recumbent posture. When the patient is in an upright position, with the corset adjusted, pressure is relieved and absorption must necessarily stop.

In Pott's disease of the spine the patient is fixed in an apparatus while in the position of suspension, to the point of comfort. The corset which is adjusted is not allowed to be removed; it is put on and permanently worn. The nurse or mother can remove it, which cannot be done with the steel brace. It is worn with comfort, and holding the spine, as it does, in an extended position, and fixing it better than it can be fixed in any other way, anchylosis will take place.

No brace or corset of any description that will support the spine can be applied effectively to a child under three years of age, owing to the narrow hips. For that reason the writer has devised a plaster-of-Paris portable bed, in which the child is placed; this permits of removal into the open air. Bonet's wire cuirass is a most efficient apparatus, but is more expensive than the plaster-of-Paris portable bed and no better. If the disease is located above the third dorsal vertebra, no corset or brace without the aid of the jury-mast can be adjusted so as to be a support, owing to the fact that the weight of the head and shoulders operate upon the point of disease or curve. In these cases the jury-mast should always be so adjusted as to transmit the weight of the head through the corset to the hips.

To make proper corsets from plaster of Paris, suitable material must be used. H. B. Claflin

& Co. make for the author a special crinoline, known as No. 100 hospital crinoline; it has the proper amount of sizing and material and a total absence of indigo. The plaster of Paris is furnished by the White Dental Manufacturing Company, put up in fifty-pound tin packages, fresh from the oven. This cloth and plaster of Paris, when properly united, make a perfect plaster bandage. The crinoline should be torn in strips six inches wide and six yards long; the cloth is drawn over a pile of plaster of Paris on a table, and all rubbed off excepting enough to simply fill the mesh of the cloth; the bandage is loosely rolled, that it may take water quickly. A tight-fitting shirt is now adjusted to the patient. The patient with lateral curvature suspends himself to the greatest possible extent. In Pott's disease the arm-pieces are used and the patient suspended to the point of comfort. The dinner-pad is placed under the shirt; three or four bandages placed in water; one of these is wound snugly around the body just above the crest of the ileum, making two or three turns; then the hips are enveloped down to the great trochanter, using one or two bandages at this point. We should begin at the bottom of the corset each time, and roll on the bandages up to the armpits, rubbing each layer until there is no longer air in the meshes of the cloth. Six bandages will do for a child under seven years; from eight to twelve for adults. When the plaster is setting, we should stand behind the patient and gently press the corset in over the crest of the ileum and firmly against the ribs. After the corset has firmly set, the dinner-pad is removed and the corset sprung antero-posteriorly, to throw it off the antero-posterior spinous process, to prevent excoriations. The corset is cut off at the bottom and top, being left on permanently in case of Pott's disease. In lateral curvature the corset is cut off, the edges trimmed with lacing, and an elastic durable spinal brace results.

If the patient desires a wood corset, fill the plaster-of-Paris corset with plaster, which makes a cast of the body, upon which the wood corset is made.

The corset in Pott's disease should be worn from six months to a year without removal; in lateral curvature it should be removed each night. Proper exercise, forcible redressment, gymnastics, and so on should be used.

The plaster-of-Paris corset is sent to the foundry in case an aluminum corset is desired, the anvil is made, and upon this the aluminum is worked; this is the most beautiful corset made.

AN ANTISEPTIC DUSTING-POWDER.

PICK commends the following in place of iodoform:

℞ Bichloride of mercury, gr. 1/6 to 1/3;
Boric acid, ℥i;
Tannic acid, ʒii;
Sugar of milk, ℥ii.

The sublimate is first rubbed up thoroughly with the sugar of milk and the other ingredients are added.

THE DANGER OF ANÆSTHETIZING DIABETICS.

BAXER (*Deut. Med. Woch.*, 1894) calls attention to the danger of narcotizing diabetics. He has reported three of his own cases and nine collected from medical literature. Even in slight cases of diabetes the patients became comatose and died. Coma did not develop until after the chloroform narcosis had passed off, in twenty-four to forty-eight hours. The patients then became indifferent, stupid, and confused. Finally, lost consciousness, urine and fæces were passed involuntarily, and they perished in coma. This communication is important, since it shows that the administration of chloroform is dangerous even when there is a slight degree of diabetes, it being impossible to predict whether or not coma will develop.

THE TREATMENT OF SPRAINS AND DISABLED JOINTS.

BRADFORD (*Boston Medical and Surgical Journal*, vol. cxxxi., No. 7) holds that in the treatment of sprained and disabled joints, the first consideration, after having given such support as is necessary to afford time for repair of the few stretched ligamentous fibres, should be directed towards checking the effusion and extravasation. This can be done by compression carried on for a short time and by such means as will improve the circulation in the principal articular tissues,—namely, the application of heat and cold, massage, and motion of the joint,—which, however, should be restricted in character so as to prevent any excess of motion or stretching of the strained ligaments.

The length of time for which it is necessary to protect from extreme motion will vary in any individual case according to the amount of reparative power, the amount of violence, and the age. There would seem to be no justification for the popular opinion that a sprain is worse than a break, an opinion which would

appear to be based upon the over-cautious treatment following such injuries, which, by interfering with the proper circulation of the part and guarded motion, increases the sensitiveness, and produces a condition which, if unchecked, may develop a disabled joint, which is more tedious than ordinary fracture.

In the treatment of sprains we should not be influenced by what is termed "anchylophobia." A sprain is not a fracture; at most, it is a tear or a rupture of some of the fibres of certain ligaments; this unites readily. If a tendo Achillis can be safely moved in a fortnight after tenotomy, certainly a few ruptured or stretched ligamentous fibres should not be regarded as grounds for fixation for a longer time.

Fixation by apparatus is only necessary if demanded to stop pain for a short time after a severe sprain.

In the early stages, motion within the pain-limit is harmless; in the later stages of a sprain, motion and use should be allowed up to the point of pain; and in some instances in hypersensitive persons, guarded and protracted motion, even beyond the point of pain, is indicated.

Compression may be advisable for a short time during what may be termed the period of effusion; after that it becomes injurious.

To improve the circulation, applications of heat and cold and rubbing are needed from the first, as well as during the whole treatment; and use of the limb, when permissible through absence of pain, is a natural means of improving circulation and nutrition. Treatment is greatly simplified by a precise diagnosis.

TREATMENT OF VAGINITIS AS PURSUED AT HOSPITAL SAINT-LAZARE.

DR. CHÉRON (*Revue Médico-Chirurgicale des Maladies des Femmes*, August 25, 1894), in his service at Saint-Lazare, has instituted the following treatment:

During the acute period, when the tumefaction and pain are such as to preclude the use of the speculum, he contents himself with injections into the vagina twice a day of a warm solution (temperature from 102° to 104° F.) of acid picric, .5-per-cent. solution, 2 to 3 fluidrachms being used each time. This injection of picric acid calms the pain in a few days, reduces the swelling, and lessens the secretion of pus.

With the introduction of the speculum he makes an application every two days to the neck of the uterus, cul-de-sac, and vagina itself, not only of the picric acid, but also of

> Resorcin, ʒxii;
> Aquæ dest., ʒx,

and packs the vagina with iodoform gauze to such an extent as to distend the cul-de-sac, to cover the cervix, and to separate the two vaginal surfaces.

Irrigations are not made at this stage, nor is the patient left undressed for any period, each dressing following the removal of the preceding one.

In obstinate cases it is sometimes necessary to cauterize the cul-de-sac of the vagina with tincture of iodine to make a cure.

SUBCUTANEOUS INJECTION OF ARTIFICIAL SERUM IN SERIOUS HEMORRHAGE.

LEMOINE reports the case of a young woman, who lost a large amount of blood during pregnancy, cured by the injection of artificial serum.

The liquid employed has the following composition:

> Sodium phosphate,
> Sodium chloride, of each, ʒii;
> Water, Oii.

He injected 1½ pints of this fluid into the buttocks of the patient, and three hours afterwards the symptoms, as well as the fluid, had totally disappeared.—*Revue Médico-Chirurgicale des Maladies des Femmes*, August 25, 1894.

TREATMENT OF METRORRHAGIA.

REINSTADIER, in *Giorn. de Farm. de Chim.*, gives the following formula:

> Ergotin, 10 parts;
> Aquæ destillatæ, 70 parts;
> Glycerin, 10 parts;
> Acid salicylic, .20 part.

A tablespoonful of this solution in three tablespoonfuls of water is injected into the rectum, the patient lying upon her stomach.

—*Revue Médico-Chirurgicale des Maladies des Femmes*, August 25, 1894.

ANTISEPTIC TREATMENT OF BURNS.

WILBOUCHEWITCH (Dissertation, Paris, 1893) concludes an article with the above heading in the following wise:

1. Fresh, superficial burns, as well as deep

ones, can heal under antiseptic treatment without the production of pus.

2. If pus is produced, the wound is disinfected, and the course remains the same as if non-infected. But if the pus is of long standing and the wound begins to granulate, then disinfection is not possible.

3. To disinfect wide-spread burns an anæsthetic will often be necessary, and to this end chloroform is best suited.

4. If the wound is non-purulent, the unnecessary use of an antiseptic hinders the healing process.

5. Antisepsis is the best analgesic.

6. Burns heal rapidly under the antiseptic treatment. Burns of the second degree require eight days; of the third degree, from two to three weeks.

7. Burns of the second and third degree heal without trace remaining; of the fourth degree, cause a scar, which does not retract, while this will be smoother the less the amount of pus.—*Monatshefte für Praktische Dermatologie*, August, 1894.

TREATMENT OF HERPES AND FOLLICULITIS VULVÆ.

In the *Journal des Maladies Cutanées et Syphilitiques*, LUTAUD prescribes the following:

In beginning herpes of the vulva one of the following formulæ:

1. ℞ Resorcin, 2;
Cocain. muriat., 1;
Spirit. vin., 100.

2. ℞ Acid. carbol., .25;
Cocain. muriat., 1;
Spirit. vin., 100.

Compresses moistened in these solutions are laid upon the vulva and covered with impervious paper; they are changed three or four times a day.

Mostly, however, one sees the herpes fully developed, when this salve will be more appropriate:

℞ Borac. porphyr., 1;
Glycerole d'Amidon, 10;
Tinct. myrrh., gtt. 10.

After which a powder of

Bismuth subnitratis, 4;
Calomel, 1,

should be dusted over them.

When the crusts have been removed,—

Pulv. lycopod., 10;
Tannin,
Bismuth subnitratis, of each, 20,

will be efficient.

When the folliculitis does not yield to simple remedies, then sitz baths or full baths of bran and starch, the vulva being washed morning and evening with hot soapsuds and powdered with

Acid tannic pulv., 2;
Bismuth subnit., 1;
Amyl., 50.

In obstinate cases, painting the surface with five-per-cent. cupric sulphate once a week and washing off with strong salt solution. Pustules should be opened when they appear.—*Monatshefte für Praktische Dermatologie*, August, 1894.

THE OPERATIVE TREATMENT OF PERFORATIVE ULCER OF THE STOMACH AND INTESTINES.

A discussion on this topic was opened by GOULD at the sixty-second annual meeting of the British Medical Association (*British Medical Journal*, October 20, 1894). First considering the subject of perforating ulcer of the stomach and duodenum, he holds that this is a somewhat common affection, particularly frequent in young, anæmic women, especially of the servant class, and in middle-aged men; the perforation is usually single. It is situated at or near the lesser curvature, towards the posterior stomach-wall, and near the pylorus. It is rarely found in the greater curvature. These ulcers cicatrize in about eighty-five per cent. of all cases. Over six per cent. perish from perforation, three to five per cent. from hemorrhage. The ulcers placed on the posterior surface of the stomach perforate, commonly, into the pancreas, causing a subdiaphragmatic abscess and suppurative pleurisy. Of the less frequent ulcers of the anterior wall of the stomach, eighty-five per cent. perforate, generally into the peritoneal cavity.

In the treatment of these cases, Billroth advises—as a precautionary measure before perforation—cœliotomy, excision of the ulcer, and suture of the resulting wound. This is scarcely justifiable, since eighty-five per cent. of these cases recover. When perforation has taken place into the general peritoneal cavity, death sometimes occurs from shock due to sudden escape of stomach contents into the peritoneal sac. Commonly the fatal issue is dependent upon peritonitis. In some cases there is no shock. When it occurs it is treated on general surgical principles. When death is

threatened from peritonitis, the important point is careful cleansing of the entire peritoneum. The operation should be performed at the earliest possible moment,—that is, as soon as primary shock has passed off. The incision should always be in the middle line. The main efforts of the surgeon should be concentrated on cleansing the peritoneum. This is best accomplished by flushing. Normal saline solution or common salt, one drachm to the pint, affords the best medium; next to that is boiled water, to be used at 110° to 112° F. The flushing must be systematic; no time or care must be spared to make this flushing absolutely thorough; it is the essential vital step in the whole operation, the one upon which success or failure hinges. Where practicable, the hole in the stomach should be sewed up, Lembert's sutures being so passed as to invert the floor of the ulcer and a part of the surrounding walls. There appears to be no advantage in excising the ulcer or paring its edges. Should the ulcer be so placed that sutures cannot be placed efficiently, or if its edges are so widely infiltrated that they cannot be enfolded, the surgeon must choose between making a gastric fistula and simple drainage of the stomach; the latter is usually preferable,—*i.e.*, pass one end of a tube into the ulcer and bring its other end out of the wound, and then pack it well round with iodoform gauze. Drainage should always be employed when peritonitis is well marked at the time of operating, the tube being placed in a separate wound above the pubes. Where there is any doubt as to the security of the gastric sutures, a large drain should also be placed with one end close to the ulcer.

When collapse occurs, and hot irrigations do not relieve it, intravenous injections of saline solution are indicated. Up to the present seven successful cases have been reported.

As to the subphrenic abscess, operation should be postponed until the abscess can be distinctly localized. Many of these ulcers run a chronic course, with no distinct indication of their exact position. It is better to wait until the position of the abscess is defined by swelling, or altered percussion-note, or other sign, when a free posterior opening should be made, if it is at all practicable.

Gould next took up the subject of perforation from typhoid ulceration of the intestine. Of seventeen reported cases there is one recovery. The details of operations are like those for perforative gastric ulcer. Perforation occurs most frequently in the third week of the disease, is usually single, and situated in the ileum. Moreover, this complication may occur in the mildest cases, and causes twenty per cent. of the deaths in this disease. Symptoms may be fulminant or latent. Life is rarely prolonged beyond two days.

Van Hook's conclusions, which have appeared in a previous number of this journal, are quoted.

Maclaren reported three cases of perforation of the stomach treated by operation, one successfully. He holds that it is not worth while to spend much time in washing out the stomach in these cases. He also emphasizes the importance of thorough cleansing of the abdominal cavity. This should be gone over systematically, and with a large, continuous stream. He begins in the neighborhood of the rupture, washes it thoroughly, then follows the course of the colon towards the cæcum, especially washing out below the liver. Next, beginning at the ulcer, the great bowel is followed to the rectum. The lumbar and pelvic hollows should receive special care. Finally, the douche is directed among the folds of the mesenteric attachments of the small intestines. It often happens that when all seems clear a fresh turn of the instrument will empty some unexpected pocket. The abdomen should be dried with sponges in the usual way. Feeding should be per rectum for a week.

Morrison reported a case operated on by Aitchison. The ulcer was in the posterior wall. The patient died on the ninth day, of peritonitis limited to the pelvis.

Barling reported three cases of perforation from gastric ulcer; two perished. The successful case was opened three weeks after operation for a circumscribed collection of pus in the left hypochondrium.

Cousins incised and drained two cases with successful results.

Harrison reported two cases of typhoid perforation. The first two perforations were found and closed; the patient perished in seventeen hours. The second case was not one of perforation, the symptoms having been caused by kink of the small intestine. The case recovered, although operated on in the acute stage of typhoid.

REVOLVER WOUND OF SKULL.

This case, reported by Schwarz (*Arch. de Laryngol.*, etc., July, August, 1894), was one of attempted suicide by means of two shots in the right fronto-temporal region. No apertures of exit were found. There was complete

consciousness, paralysis of the right abducens nerve, blindness of the right eye, and copious epistaxis. The man left the hospital in eleven days in good condition, but with a continuance of the ocular abnormalities. Six months later he returned, having had severe epistaxis at long intervals, and having become extremely anæmic. A severe epistaxis occurred, being most marked from the left nostril. The left external carotid was tied, and for some days there was no hemorrhage. Bleeding returned, however, most severely from the right nostril, and the right external carotid was ligatured. Two days later epistaxis returned as severely as ever. Schwarz felt sure that the blood came from the internal carotid artery, and determined to explore the cavity of the nose, which he exposed by Ollier's operation of turning this organ down. He was then able to pass his index finger into both sphenoidal sinuses, which communicated, where he found clots of blood. He plugged the sinuses with iodoform gauze, which he left for a fortnight. He then removed the plugs, and in less than another fortnight dismissed the patient free from his trouble. He made a good recovery.—*British Medical Journal*, October 6, 1894.

STERILIZATION OF CATGUT.

EASTMAN (*Annals of Surgery*, vol. xx., No. 1, 1894) sterilizes catgut by heating it to 212° F. for three hours in olive oil. He claims that a strong, smooth, absolutely sterile catgut is thus prepared.

CRANIECTOMY IN MICROCEPHALUS.

BECK (*Journal of the American Medical Association*, November 3, 1894) concludes a very thorough statistical study upon the subject of craniectomy in microcephalus as follows:

Craniectomy is a justifiable operation and apt to be successful in the treatment of microcephaly with idiocy.

The success depends on the kind of microcephaly and the degree of idiocy.

Acquired and late forms give a better prognosis than congenital forms.

The danger of the operation is not very great.

The operation ought to be quite extensive,—that is, the incision in the skull large enough to permit dilatation,—and the circular method of Gersuny ought to be given a trial.

The patients must be given a thorough pedagogic treatment afterwards.

The single cases ought to be followed up for years and reported from time to time.

The mortality in seventy-two reported cases is seventeen per cent. The dangers of operation are shock, hemorrhage, and infection. As a means of lessening shock, chisel and hammer should be discarded. The operation should be pushed as rapidly as possible, and hot applications to the head are advisable. Hemorrhage may be serious, but is rarely so. Bleeding from the skull can be checked by an Esmarch rubber band fastened tightly around the head. Should the dura be injured it must be sewed.

Of the twelve fatal cases, death was due in six to shock, one to heart failure, one to loss of blood, two to infection, and in two no cause was assigned.

OPERATION IN PERITONEAL ADHESIONS.

NICAISE (*Rev. de Chir.*, August, 1894) states that the use of antiseptic methods and the consequent development of antiseptic surgery have made surgeons better acquainted with peritoneal adhesions, and have led to their successful treatment by operation. These adhesions may give trouble by disturbing the functions of implicated organs and by exciting pain. The painful sensations vary in character and intensity in different cases. They may be caused by displacement of the organs to which the adhesive bands are attached, or by constriction of the intestinal canal. The pains in the latter condition are often very severe, and of a similar nature to those of hepatic and renal colic. The diagnosis of peritoneal adhesions is often very difficult; in some cases their existence can be assumed only by a process of exclusion, whilst in others, certainty as to their presence or absence cannot be attained except by an exploratory laparotomy. The author is of opinion, however, that a diagnosis may be made in many cases by close inquiry concerning such details as the previous occurrence of abdominal inflammation, the seat of the pain, and the relation of such seat to that of old inflammatory attacks; the time when the pain comes on with regard to the taking of food, and, in females, to the periods of menstruation. As many peritoneal adhesions become longer and thinner, and have a tendency to disappear, there should be no hurry in having recourse to operative treatment. When, however, they cause very severe and frequently renewed pain, although the

compression of an abdominal belt or bandage or massage may give relief, the only method of dealing effectually with such trouble is the performance of laparotomy and the destruction of the adhesions. The cure that may be thus effected will be complete and permanent; but, it is pointed out, as laparotomy is a serious operation, unless practised under very strict antiseptic conditions, it ought not to be applied in cases of peritoneal adhesions unless these cause intolerable pain.—*British Medical Journal*, October 20, 1894.

Reviews.

PRACTICAL URINALYSIS. By Charles W. Purdy, M.D. Illustrated.
Philadelphia: The F. A. Davis Company, 1894.

Dr. Purdy is very well known to many members of the profession for his valuable contribution to the study of diabetes and to some extent for his work in urinary analysis. The present volume, while it adds nothing of very great note to the subject of which it treats, is a well written, accurate contribution to the literature of the subject.

We can heartily recommend the book to those of our readers who wish a complete manual and who desire a volume which will aid them in their microscopical studies by reason of the many illustrations which it contains, quite a number of which are colored.

THE PHYSICIAN'S VISITING-LIST FOR 1895. Forty-fourth year of its publication.
Philadelphia: P. Blakiston, Son & Co., 1895.

When a visiting-list has obtained the popularity of Blakiston's, nothing more is necessary at the beginning of each season than the announcement that the publishers have continued its issuance as in previous years. While maintaining all the advantages which it has possessed in the past, nothing new has been added to the present issue which is worthy of notice, and the words of praise which we gave last year's issue are entirely applicable to the publication for 1895.

ESSENTIALS OF DISEASES OF THE SKIN. By Henry W. Stelwagon, M.D., Ph.D. Third edition, revised and enlarged.
Philadelphia: W. B. Saunders, 1894.

If there is any subject which lends itself readily to the form of questions and answers, it is probably dermatology, and Dr. Stelwagon has utilized the possibilities of this form of book-making to the highest degree in preparing his little manual. The half-tone illustrations which have been introduced into this edition very materially increase its value, while the clear and concise descriptions concerning the diagnosis and treatment of various skin-affections, endorsed as they are by the author's wide experience, render any advice he may give reliable and accurate. We doubt not that Dr. Stelwagon's book will continue to grow in popularity.

A SYNOPSIS OF THE PRACTICE OF MEDICINE. By William Blair Stewart, A.M., M.D.
New York: E. B. Treat & Co., 1894.

We regret that we cannot review this book as favorably as we would like to do. It gives evidence of crudity in style and expression which condemns it as a book for the student, and in many places is so imperfect in its description of the diagnosis and treatment of disease as to convey an erroneous idea to the mind of the reader. Thus, under the head of Parotitis, the only point named under diagnosis is the eating of a sour pickle or lemon. Under Tetanus, we are told that it is *probably* due to a micro-organism, which is hardly the present view of the case.

We are surprised to find under the same character of head as is found at the top of the description of each disease, the word Tuberculin, which might, therefore, be considered by the tyro as a disease and not as a remedy.

TEXT-BOOK OF MEDICAL CHEMISTRY FOR MEDICAL AND PHARMACEUTICAL STUDENTS AND PRACTITIONERS. By Elias H. Bartley, B.S., M.D. Third edition, revised and enlarged. Illustrated.
Philadelphia: P. Blakiston, Son & Co., 1894.

The student of medicine often finds in medical chemistry much that is difficult to understand, especially if his knowledge of general chemistry is limited.

The arrangement of a book, the definitions, etc., add much to its value. Many books contain much that is valuable, but the subject-matter is presented in such a manner as to confuse instead of making clear to the student the subject discussed. In this book the author has not only demonstrated his thorough knowledge of the subject, but has written in a manner which clearly shows him to be a teacher as well as a writer, by placing that which is essential in such a manner as to at once arrest the attention of the student.

The greater part of this book is necessarily a compilation, differing only in individuality in

presentation from other works, yet much has been added which is new and of practical value. The book is arranged to cover the more extended course now given in most medical colleges.

The chapter on physiological and clinical chemistry is the most valuable addition in this edition, especially that portion devoted to the examination of urine. The appendix contains many valuable and useful tables. In this third edition the author deserves the same support of the profession which his previous editions have merited. D. B. K.

ESSENTIALS OF CHEMISTRY AND TOXICOLOGY. By R. A. Witthaus, A.M., M.D. Twelfth edition.
New York: William Wood & Co., 1894.

In sixteen years twelve editions of this very diminutive little quiz-book, which is arranged in the form of questions and answers, have been called for. Just small enough to fit a pocket, we can readily understand how medical students have pored over its pages in brief moments of leisure when they wished to refresh their memories as to some major point which had slipped from them in the hurry of their other work. Professor Witthaus is too successful a teacher to wish his students to depend upon so small and incomplete a book for their chemical knowledge, and has, as is well known, prepared a larger volume, which, in popularity, has almost equalled the minute one we are now noticing.

A MANUAL OF HUMAN PHYSIOLOGY. PREPARED FOR STUDENTS OF MEDICINE. By Joseph H. Raymond, A.M., M.D. Illustrated.
Philadelphia: W. B. Saunders, 1894.

The author of this little octavo volume of less than four hundred pages tells us in his preface that a long experience with medical students has brought him to the conclusion that some very thorough and brief work upon physiology would be of particular value to them. He has therefore attempted to cover this important subject in the brief space which we have named.

The volume is larger than a quiz-book and far smaller than a complete text-book, and we do not think that for these and other reasons it can be recommended either to the student or graduate, as the statements which it contains are so exceeding concise as to be imperfect, and its character is too elementary for the student of medicine to obtain a sufficiently deep knowledge of this fundamental subject in medical study. We doubt not that it may prove useful to classes in physiology in high schools or similar institutions.

A CLINICAL MANUAL AND GUIDE TO THE PRACTICAL EXAMINATION OF THE EXCRETIONS AND SECRETIONS, AND OF THE BLOOD. FOR THE USE OF PHYSICIANS AND STUDENTS. By Andrew MacFarlane, A.M , M.D.
New York: G. P. Putnam's Sons, 1894.

This book, which is a small octavo and contains less than one hundred and fifty pages, is, we think, one of the best brief summaries of clinical diagnosis that has been published for some years. It is copiously illustrated, and describes carefully the most recent means employed in urinary and other examinations, as, for example, the employment of the centrifuge. The various well-recognized tests in clinical analysis are carefully but briefly given, and a sufficient number of illustrations, colored and otherwise, are introduced to properly elucidate the text. Whenever there is a possible source of error in the tests which are suggested these possibilities are carefully pointed out.

We can heartily recommend the book to the busy, active practitioner, as giving him in a nutshell the necessary points in clinical diagnosis which he needs in daily practice.

PRESCRIBING AND TREATMENT IN THE DISEASES OF INFANTS AND CHILDREN. By Philip E. Muskett. Third edition.
Edinburgh: Young K. Pentland, 1894.

After looking over this book and the numerous polypharmacal prescriptions which it contains, we cannot avoid calling attention to the author's name and its similarity with what is known as the "shot-gun prescription." In many instances, however, the compiler has obtained from the writings of recognized authorities upon pediatrics very valuable diagnostic and therapeutic points, and the book is therefore not as bad in its influence as might be imagined by a brief glance at its pages. We doubt very much whether it will prove of much value or interest to the American practitioner.

The first half of the book is taken up with the various drugs and other applications to children's diseases and the second half to the treatment of disease in infants and children, while the end, which is known as Part III., perhaps forms the most valuable portion of the brochure, giving a number of recipes.

LOCAL ANÆSTHETICS AND COCAINE ANALGESIA: THEIR USES AND LIMITATION. By Thomas H. Manley, A.M., M.D.
St. Louis: J. H. Chambers & Co., 1894.

Dr. Manley is such an enthusiastic worker in surgery that we regret having to adversely criticise his contribution to this important subject. In his dedication he tells us that the book is a "hurriedly written contribution," which is an admission of a fact which any one who reads

the pages speedily discovers, and his remark in his preface, that the age is one of "lightning progress," should, we think, have caused him, in writing upon so new a subject, to do as St. Paul did, "cast four anchors out of the stern and pray for the day." That care should be exercised in writing a book dealing with so important a topic is evident to every one, and the neglect of such care fails to render medicine the service which Dr. Manley is so well capable of rendering.

We hope that, should the book ever come to a second edition, Dr. Manley will go over its pages and carefully revise them from the point of view of the surgeon and *littérateur*.

A Compend of the Practice of Medicine, containing a Section on Skin-Diseases and One upon Mental Diseases. By Daniel E. Hughes, M.D. Fifth edition, thoroughly revised and enlarged.
Philadelphia: P. Blakiston, Son & Co., 1895.

This book has now been before the profession for some twelve or thirteen years, and has, as our heading indicates, been revised a number of times by its author, who has endeavored to compass the difficult task of putting in all the new things in medicine without increasing the size of the book to the dimensions of a text-book. He has also changed its character somewhat from that of a compilation of the views of others, in that he has included in many instances the results of his own personal experience, which has naturally been rich, because of the opportunities which he has had as the chief resident physician in one of the largest hospitals in the world. The volume, which is a small octavo of five hundred and sixty-eight pages, is the best of its kind with which we are acquainted, and we heartily recommend its use by the student, provided he will also employ as his chief source of learning the lectures upon the practice of medicine which he is supposed to attend and the large and complete text-books on practice which all good medical institutions recommend to their classes.

Text-Book of Hygiene. By George H. Rohé M.D. Third edition, thoroughly revised and largely rewritten. Illustrated.
Philadelphia: The F. A. Davis Company, 1894.

The third edition of Dr. Rohé's book on Hygiene has been enriched by a new chapter on Quarantine by Surgeon-General Wyman and Dr. Geddings, of the United States Marine Hospital Service, while Dr. Gihon, of the navy, has revised his original chapter upon Marine Hygiene, and Dr. Egbert, of Philadelphia, that upon Vital Statistics.

Up to the time of the publication of the book on Hygiene by Coplin and Bevan, which was published about a year ago, there was no volume published in this country which in character and price made it suitable to use as a text-book in a medical school. We now have two contributions by American authors of which the profession in this country may be proud. The present volume contains about five hundred and fifty pages, and is printed in unusually large type on good paper.

Notes and Queries.

DIPHTHERIA ANTITOXINE.

We are glad to be able to announce that Parke, Davis & Co., of Detroit, are engaged in the preparation of diphtheria antitoxine. As it requires a considerable length of time to prepare the serum, they are unable to provide it at once, but expect to be able to supply the profession very shortly.

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INDEX TO VOLUME X., THIRD SERIES.

(WHOLE SERIES, VOLUME XVIII.)

PAGE

Abdominal Incision ... 59
Abortion, Curetting ... 505
Abscess of Appendix ... 779
Acetanilide for Vomiting ... 736
in Surgery ... 640
Acne ... 691
Vulgaris ... 774
Aconite ... 754
Aconitine, Poisoning by Crystallized ... 119
Actinomycosis of Jaw ... 35
treated by Iodide of Potassium ... 62
Adler, Lewis H., Non-Operative Methods of treating Anal Fissure or Irritable Ulcer of Rectum ... 445
Albuminuria associated with Pregnancy ... 177
Albuminuric Phosphaturia ... 171
Alcohol in Pneumonia ... 35
Physiological Actions of ... 223, 301, 371
Alcoholic Inebriety ... 37
Alcoholism ... 238
treated by Strychnine Nitrate ... 402
Alopecia ... 65
Alumnol ... 271
Alvarenga Prize of the College of Physicians of Philadelphia ... 792
Amenorrhœa, Binoxide of Manganese in ... 242
American Medical Association ... 288, 359
Amorphous Phosphorus, Advantages of, over Official Form ... 19
Amputation in Old Cases of Infantile Palsy ... 716
Amputations and Mechanical Restorations ... 516
Amyl, Valerianate of ... 263
Anæmia, Nature, Diagnosis, and Treatment of Pernicious ... 376
Anæsthesia ... 127
Collective Investigation Committee's Report at the Recent Surgical Congress in Berlin ... 551
Local ... 832
Technique of Chloroformization ... 156
Anæsthetics, Administration of, Clinically ... 415
Shall they be given to those suffering from Heart-Disease? ... 164
Uses and Misuses of ... 552
Anal Fissure or Irritable Ulcer of the Rectum, Non-Operative Methods of ... 443
Tags ... 768
Anders, J. M., Treatment of Erysipelas ... 447
Aneurism, Innominate, treated by Simultaneous Ligature of Carotid and Subclavian Arteries ... 270
treated by Venesection ... 606
Ankle-Joint, Compound Fracture of ... 714
Ankle, Utility of Amputations near ... 514
Anschutz's Purified Chloroform ... 612
Antineuralgic, New ... 331
Antipyonine in Ocular Therapeutics ... 484
Antipyrin as a Local Anæsthetic in Diseases of Nose and Throat ... 265
in Urethral Injections ... 269
Method for the Estimation of ... 689
Toxic Symptoms produced by ... 556
What is the Safe Dose of ... 674
Antisepsis in Hepatic Colic and Biliary Lithiasis ... 112
Antiseptic Medication, Dangers of Internal ... 745
Antrum Abscess ... 673
Anus, Fissure and Painful Erosion of Rectum in Infants and Children ... 277
Resection of Inguinal Artificial ... 541
Aphorisms relating to Obstetrics ... 764
Aphrodisiac Treatment in Women ... 419
Apocodeine ... 102
Apocynum Cannabinum in Heart-Disease ... 683
Apoplexy ... 341, 611
Appendicitis ... 140, 425, 536, 826
Address on ... 385
After-Treatment of Operations for ... 498
Chronic relapsing ... 428
Obliterans ... 643
Rational Treatment of ... 714
Recurrent ... 639
strictly a Surgical Lesion ... 632
Arsenic and Cancer ... 331
Arterial Pressure, Treatment of High ... 589
Artificial Respiration in Cerebral Compression ... 675
Asaprol in Acute Articular Rheumatism ... 252
Therapeutic Uses of ... 99
Ashton, T. G., Treatment of Pleuritic Effusions ... 597

PAGE

Asparagus, Action of, on Kidney ... 607
Asthma, Prescription for ... 552
Astigmatism, Suggestion of an Operation to Correct ... 483
Atonic Gastric Dilatation ... 469
Atony of the Intestine ... 715
Atropine and Morphine, Antagonism of ... 52
and Scopolamin, Certain Dangers attending their Use ... 133
Influence of, upon Respiratory Volume ... 825
Aural Vertigo ... 564

Bacterial Toxines and Antitoxines ... 185
Ball, James Moores, Two Cases of Traumatic Cataract in Children; Extraction; Successful Results ... 661
Barbour, Llewellyn Phelps, Treatment of Phthisis by Tuberculin ... 433
Barr, G. Walter, Pilocarpine in Erysipelas ... 289
James, Treatment of Mitral Stenosis ... 148
Baruch, Simon, Value of Cold Bath in Treatment of Asthenic Diseases other than Typhoid Fever ... 5
Bassini's Operation ... 569
Baths, Warm ... 421
Beef-Powder, Home-Made ... 696
Belladonna, Use of, in allaying Irritation and healing Certain Skin-Diseases ... 665
Benedict, A. I., What can be done in Diagnosis and Treatment of Gastric Diseases without the Use of Stomach-Tube? ... 587
Benzine-Poisoning and Abuse of Benzine ... 464
Benzonaphthol and Bismuth Salicylate in Summer Diarrhœa ... 833
Biliary Calculus obstructing Cystic Duct, Removal of, by Injection of Ether ... 783
Bishop, H. M., A New Bloodless Operation for Excision of Hemorrhoids, with Healing by First Intention ... 361
Bismuth-Poisoning ... 165
Subgallate (Dermatol) ... 234
Bladder, Drainage of, by Means of Oblique Fistula after Suprapubic Cystotomy ... 60
Impermeability of, to Medicaments and Poisons ... 710
Stone Operations ... 572, 852
Tuberculosis ... 566
Blepharitis Marginalis treated by Hydrogen Dioxide ... 347
treated by Corrosive Sublimate ... 560
Blepharospasm, Cure of ... 23
Blood in Cases of Septic Infection ... 270
Bloodless Amputation at Hip-Joint ... 64
Blood-Serum, Dynamogenic Effects of ... 169
Bokenham, T. J., Notes on Some New Drugs Useful in Ophthalmology ... 652
Bone-Marrow in Pernicious Anæmia ... 699
Booth, A. W., Preparation of Surgical Catgut ... 810
Bowel, Case of Enterectomy for Gangrenous ... 352
Brain, Punctured Wounds of ... 424
Bright's Disease, Value of Various Diets in ... 189
Bromethylformine in Treatment of Epilepsy ... 535
Bromide of Ethyl, Death from ... 540
-of-Potassium-Poisoning ... 175
Bromoform in Whooping-Cough ... 697
Bronchitis ... 341
Brown, Bedford, Fractures of Neck of Femur and their Treatment ... 362
Observations on Action of Chloroform on the Functions of the Human Brain and Spinal Cord, as witnessed in Extensive Injuries of the Cranium and Brain ... 793
Use of Hypodermics of Alcoholic Stimulants for the Resuscitation of Still-Born Infants ... 730
Brown-Séquard, Injections in Ocular Therapeutics ... 194
Burns ... 568
Antiseptic Treatment of ... 279, 838
in Children ... 275

Cæsarean Operation, Mortality of, in Great Britain during the Last Eight Years ... 615
Caffeine, Employment of, in Children ... 464
New Application of, in Diseases of Heart and Kidneys ... 463
Caldwell, W. C., Actions of Drugs upon the Kidney ... 8
Camphorated Carbolic Acid as an Antiseptic Agent ... 123
Camphorated-Oil-Poisoning ... 179
Canthoplasty, Departure in Operation of ... 50
Cantrell, J. Abbott, Thyroid Feeding in Psoriasis ... 600
Carbonic Oxide on Eye ... 131
Carcinoma of the Breast, Operation for Cure of ... 828

PAGE

Carcinoma Uteri, Early Treatment of ... 186
Calomel administered internally in Pseudo-Membranous Laryngitis ... 125
Diuretic Action of ... 745
Camphor Naphthol in Tubercular Adenitis ... 355
Cancer of Rectum ... 492
of Stomach ... 350
Treatment of ... 604
Cantrell, J. Abbott, Bismuth Subgallate (Dermatol) ... 234
Carbolic Acid, Treatment of Erysipelas with Hypodermic Injections of ... 458
Carlsbad Thermal Water on Stomach Function ... 406
Carotid, Successful Ligature of Common ... 570
Carpenter, J. S., Diphtheria theoretically and practically considered ... 582
Caruncles, Urethral ... 424
Cataract Extraction, Dangers of Sublimate Solution in ... 268
Irrigation of Anterior Chamber in ... 52
with Iris Retractor ... 48
Extractions and Subsequent Dressing ... 194
Immediate Capsulotomy following Removal of ... 484
Modified Operation for Extraction of ... 131
Pathogenesis and Prophylaxis of Intraocular Hemorrhage after Extraction of ... 559
Traumatic ... 487
Two Cases of Traumatic, in Children ... 661
Catgut Sterilization ... 602, 810, 861
Sterilized in a Convenient and Portable Form ... 569
Cerebral Tumor diagnosed by Focal Symptoms, etc ... 206
Surgical Treatment of ... 96
"Cerebrine" again ... 326, 359
Cerna, David, Physiological Actions of Alcohol ... 223, 301, 371
Cervical Glands, Enlarged ... 323, 856
Chancre, Soft ... 274
treated with Peroxide of Hydrogen ... 200
Treatment of, with Peroxide of Hydrogen Spray ... 714
Chancroid, Phagedenic ... 491
Children, How to give Pills to ... 624
Treatment of some Frequent Maladies in ... 852
Chloral Hydrate ... 688
Chloralose ... 263, 630, 678
Chloride of Ethyl and Cocaine in Minor Surgery ... 679
of Methylene, Chloroform, and Tetrachloride of Carbon ... 467
Chloroform Anæsthesia, Persistent Sneezing under ... 471
Confirmatory Work upon Action of ... 675
Decomposition Products of ... 678
during Sleep ... 758
Experiments and Clinical Observations on Action of ... 104
in Internal Medicine ... 737
not Contraindicated in Kidney-Disease ... 35
Observations on Action of, on the Functions of the Human Brain and Spinal Cord, as witnessed in Extensive Injuries of the Cranium and Brain ... 793
on Cardiac Rhythm ... 698
versus Ether Narcosis ... 280
Cholecystenterostomy, with Remarks on Intestinal Anastomosis and Exhibition of a New Approximation Button ... 75
Cholera Infantum treated by a Diet of Water and Sterilized Milk ... 740
Chorea ... 117, 410, 414, 537
Eye-Treatment of ... 486
Christian, H. M., Treatment of Gleet due to Presence of Strictures of Large Calibre ... 73
Treatment of Gonorrhœa by Irrigation of the Urethra ... 723
Cinnamic Acid, Treatment of Tuberculosis with ... 248
Cinnamon Oil, Antiseptic Properties of ... 232
Circumcision, Incontinence of Urine and Fæces cured by ... 708
New Dressing for ... 80
Club-Foot, Amputation of Both Legs at the Knee-Joint for Paralytic, in a Case of Spina Bifida complicated by Congenital Inguinal Hernia ... 822
Coal-Tar, Compound Tincture of ... 543
Cocaine in Cystitis ... 571
in Minor Surgery ... 696
in Nasal Treatment, Abuse of ... 135
in Production of Anæsthesia of Skin and Tissues beneath ... 122
New Method of using, for Local Anæsthesia ... 541
Poisoning ... 135, 425, 430
Codeine, Poisoning from an Overdose of ... 32
Cœliotomy in Typhoid Perforation ... 779
Cohen, Solomon Solis-, Different Forms of Diabetes Mellitus, with Remarks on Treatment ... 290
Cold Bath in Treatment of Asthenic Diseases other than Typhoid Fever ... 5
Cold Douche and Taxis in Strangulated Hernia ... 56
Colic, Pseudo-Biliary ... 413
Colles Fracture ... 705
Collyria, Abuse of ... 486
Partial Suppression of ... 558
Coma ... 785
Congenital Hydrocele of Neck cured by Drainage and Compression ... 564
Congress of American Physicians and Surgeons ... 286
Conium in Spasmodic Torticollis ... 178
Conjunctival Cul-de-Sac, Disinfection of ... 422
Hyperæmia ... 325
Sac, Experimental Researches on Antiseptics in Ocular Operations and on Bacteriology of ... 193
Conjunctivitis ... 347, 834
Diphtheritic and Membranous ... 243
Lotion ... 207
Pseudo-Membranous ... 267
Constipation, Habitual, in the New-Born ... 542
Contreras, Angel, Anæsthesia. Technique of Chloroformization ... 156
Cord, Single Ligation of, in Obstetric Practice ... 255
Cornea, Value of Direct Massage of, in Corneal Opacities ... 849

PAGE

Corneal Lesions, Dangers of Non-Sterile Alkaloidal Collyria in ... 531
Corrosive Sublimate, Additional Note on Subconjunctival ... 95
and Gray Oil, Clinical Investigation to determine Value of, Hypodermically, in Syphilis ... 319
in Diphtheritic Angina ... 739
Intravenous Injections of ... 411
Coryza ... 142
Country Surgery, More Heroism in ... 433
Craniectomy in Microcephalus ... 861
Creosote, Effect of, on the Virulence of Tubercle-Bacillus ... 672
in Tuberculosis ... 739
Croup, Tracheal Irrigations in ... 251
Croupous Pneumonia ... 752
Cupreine, Quinethyline, and Quinopropyline, Physiological Action and Uses of ... 743
Curettage, Technique of ... 777
Cut-Throat ... 643
Cystico-Lithectomy ... 704
Cystitis, Ammonium Chloride as a Remedy in ... 106
in the Female ... 745, 850
Painful, treated by Drainage of Bladder ... 572
Prevention of Catheterization ... 565
Cystocele or Prolapse of Bladder and Uterus ... 55

Davis, G. G., Utility of Amputations near the Ankle ... 514
Defecation, Painful ... 769
Delirium Tremens ... 682
Dentalgia ... 476
Diabetes ... 413
Mellitus ... 290, 533
Effect of giving Levulose and Inulin in ... 840
treated with Salicylate of Sodium ... 539
Prescription for ... 265
Surgical Intervention in ... 198
treated with Extract and by Grafts of Sheep's Pancreas ... 649
with Fluid Extract of Jambul e Cortice ... 628
Diabetic Coma ... 125
Diabetics, Danger of Anæsthetizing ... 857
Diarrhœa ... 408
Chronic ... 527
Digitalis, Cumulative Action of ... 603
in Children ... 333
Diphtheria ... 168, 171, 413, 469, 546, 570, 746, 801
and Pseudo-Membranous Laryngitis ... 465
Antitoxine Treatment of ... 759, 864
Clinical, Bacteriological, and Therapeutic Study of Ocular Study and Experimental Research in ... 267, 783
Local Treatment of ... 145
Nature and Management of ... 749
New Treatment of ... 686
Prophylaxis and Treatment of ... 45
Serum Treatment of ... 539
Steresol in ... 735
theoretically and practically considered ... 582
Disease, Antipyretic Treatment of Acute ... 680
Disinfection ... 633
Diuretin, Note of the Therapeutics of ... 629
Dixon, Samuel G., Possible Relationship between the Tubercular Diathesis and Nitrogenous Metabolism ... 819
Drainage, Methods of, with some Remarks on a New Aseptic Drainage-Tube ... 498
Dressing, Drainage in Combination with a Permanganate ... 279
Dropsy, Practical Observations on the Formulas and Actions of Certain Diuretics and Purgatives in Treatment of some Forms of ... 107
Drugs and Poisons ... 755
Drumhead and Ossicles, Cases suitable for Excision of ... 81
Duboisia, Peculiar Action of Sulphate of ... 561
Duboisine ... 180
Action of, upon Nutritive Processes ... 342
Sedative Action of, when given in Continued Doses, in Treatment of the Insane ... 111
Dulcin ... 476
Dulles, Treatment of Hydrophobia ... 451
Dunbar, Eliza W., Use of Belladonna in allaying Irritation and healing Certain Skin-Diseases ... 665
Dusting-Powder, Antiseptic ... 857
Dysentery, Injection in ... 551
Dysmenorrhœa ... 276, 538
Dilatation of Cervix in ... 58
Dyspepsia in Women ... 461
of Strumous Children ... 661

Ear-Diseases, Pilocarpine in ... 265
Eck's Operation ... 767
Eczema ... 275
in Children ... 786
Introduction to a Discussion on the Management of ... 667
of Ear ... 264
Elæomyenchysis ... 429
Electric Currents on Diseased Eye ... 269
Electricity, Statical, in Eczema ... 644
Electrolysis in Stricture of Lachrymal Duct ... 560
upon Development of Staphylococcus and Streptococcus ... 134
Eliot, Llewellyn, Treatment of Fractures of Shaft of Femur ... 595
Empyema ... 508
New Operation for Chronic ... 197
Enterectomy; End-to-End Anastomosis; Cholecystenterostomy with Murphy's Button ... 203
Enteric Fever, Use of a Combination of Carbolic Acid and Chloroform in ... 460
Enteritis, Muco-Membranous ... 849
Obstinate Membranous ... 629
Enuresis, Nocturnal ... 540
Epididymitis ... 568

PAGE

Epilepsy....466, 755
cured by Removal of Peripheral Irritation.... 38
Medicinal Treatment of.... 756
New Treatment of.... 35
Traumatic.... 421
Epileptics, Effect of correcting Errors of Refraction in.... 51
Epiphora.... 134
Epistaxis.... 741
Epithelioma.... 484
of Corneo-Scleral Junction cured by Injections of Sublimate 560
of the Skin.... 731
treated with Chlorate of Potassium.... 560
Ergot in Periodic Neuralgia.... 342
Erysipelas.... 276, 447, 490
Effects of, on Epithelial Cancer.... 567
Facial.... 496
in Children.... 717
Eserine in Iritis.... 131
Ethyl Bromide and Chloroform Narcosis.... 343
Death from.... 329
Chloride, Local Anæsthesia by.... 118
Evisceration Bulbi.... 558
Exanthemata.... 848
Exothyropexia in Exophthalmic Goitre.... 410
Eye, Action of Hydrochlorate of Scopolamine on.... 160
Ear, Nose, and Throat, Practical Points in treating.... 348
Employment of an Oil of Biniodide of Mercury as an Antiseptic in Certain Affections of.... 195
Experimental Study of the Galvanolytic-Kataphoric Influences on the.... 559
Minor Plastic Operations about.... 485
Strain, Medicinal Treatment of some of the Consequences of 530
Treatment of Epileptics.... 133

Face Presentations, Management of.... 836
Feet, Blisters of the.... 269
Hypersecretion of Sweat-Glands of.... 273
Neebe's Treatment of Sweating, by Crude Hydrochloric Acid.... 478
Sweating.... 167
Female Pelvic Organs, Conservative Treatment of.... 573
Fenwick, W. Soltau, Dyspepsia of Strumous Children and its Treatment.... 661
Ferratin.... 240, 610, 758
Fevers, Management of.... 554
Fixation in Fractures into Joints.... 776
Food for Infants.... 679
Foot Ulcers.... 271
Formulas.... 557
Fracture of Dislocated Humerus.... 570
Fractures.... 270
Ambulatory Dressings of.... 495
of Joints.... 563
of Neck of Femur and their Treatment.... 362
of Shaft of the Femur, Treatment of.... 595
Free, Spencer M., More Heroism in Country Surgery.... 433
Furunculosis.... 851
Fyffe, W. Kington, Effect of Creosote on the Virulence of the Tubercle-Bacillus.... 672

Gallanol in Eczema and Psoriasis.... 98
Microbicidal Action of.... 163
Gall-Bladder and Bile-Ducts, Surgery of.... 488
Surgery of.... 57
Gallic Acid, Toxic Effect of.... 121
Gallinol.... 271
Gallobromol in Acute and Chronic Gonorrhœa.... 280
Gall-Stone Colic.... 24
Gastroplication.... 490, 713
Gastrostomy after Witzel's Method.... 273
Gavage.... 470
Germain Sée on Ferratin.... 830
Glaucoma.... 135
Hemorrhagic, and its Treatment.... 28
Gleet due to Presence of Strictures of Large Calibre.... 73
Glycerin Injections as an Oxytocic.... 643, 769
into the Uterus for the Purpose of inducing Premature Labor.... 773
Glycero-Phosphates, Therapeutic Uses of.... 535
Gonococcal Conjunctivitis.... 136
Gonorrhœa, Abortive Treatment of.... 25
Chronic.... 774
Early Treatment of.... 703
in Women.... 351, 784
Janet's Method.... 571
of the Uterus.... 717
Treatment of, by Irrigation of the Urethra.... 723
Gonorrhœal Arthritis.... 280
Orchitis.... 269
Goitre, Interstitial Injections of Iodine.... 247
Gout.... 170
Gray Oil and Bichloride of Mercury Hypodermically in Syphilis.... 327, 404
Guaiacol, Absorption of, by Skin.... 251, 467
as an Antipyretic.... 94, 110, 159, 329, 332, 415, 460
as a Topical Application in Acute Tonsillitis.... 328
in Facial Erysipelas.... 170
in Orchitis.... 476
Paintings and their Antipyretic Action.... 188
Physiological Actions of the Substitution Products of.... 169
Poisoning.... 544
Gumma, Syphilitic Episcleral.... 557
Gundrum, F., New Dressing for Circumcision.... 80
Gunshot Wounds of Intestines, Abdominal Section with Enterorrhaphy.... 63

PAGE

Hæmatoporphyrinuria after Trional.... 476
Hæmoptysis.... 478
Hæmostatic, Calcium Chloride.... 128
Hair, Removal of Moles, etc., by Electrolysis.... 118
Hallux Rigidus.... 642
Hands, Cleansing of, for Surgical Operations.... 269
Hartzell, M. B., Treatment of Epithelioma of Skin.... 731
Headache, Salicylate of Sodium in.... 335
Headaches, Treatment of, after Failure to yield to Coal-Tar Products.... 241
Heart-Disease, Chronic, by Baths and Gymnastics, as carried out at Nauheim.... 668
Treatment of.... 735
Hectic State.... 473
Heffron, John L., Treatment of Diphtheria.... 801
Hemiplegia during Perflation of an Empyema Cavity.... 619
Hæmorrhage, Cerebral.... 703
Control of, in Shoulder Amputations.... 635
Subcutaneous Injection of Artificial Serum in Serious.... 858
Hemorrhagic Emissions.... 199
Hemorrhoid, Enormous Oval, encircling the Anus.... 233
Hemorrhoids.... 545
Bloodless Operation for Excision of.... 632
with Healing by First Intention.... 361
External.... 476
Internal.... 631
Non-Operative Treatment of.... 760
Simple Method of treating Wound after excising.... 60
Hepatic Colic, Glycerin in.... 546
Prescription for.... 547
Hernia in Children.... 831
Infantile, of the Inguinal Type in the Male.... 204
Radical Operation for Large, in Male Children.... 427
Strangulated.... 701
Ventral, following Laparotomy.... 203
Heron Watson's Method of Excising the Wrist-Joint.... 705
Hip-Joint Amputations.... 281
Holl peter, W. C., Therapeutic Notes on Whooping-Cough.... 658
Homatropine and Cocaine Disks as Substitutes for Atropine, Duboisine, and Hyoscine.... 348
Horwitz, O., Clinical Investigation to determine the Value of Corrosive Sublimate and Gray Oil administered Hypodermically in the Treatment of Syphilis.... 319
Hughes, W. E., and Carter, W. S., Injection in Pneumonia and Typhoid Fever of Serum from Convalescents.... 365
Hydrocele, Open Incision in Uncomplicated.... 498
Radical Cure of.... 255
Hydrogen Peroxide in the Peritoneal Cavity.... 127
Researches regarding.... 333
Hydrophobia; Statistics desired.... 720
Treatment of.... 451
Hydrotherapy in Treatment of Pulmonary Tuberculosis.... 728
Hyoscine, Extraordinary Effects of.... 469
Untoward Effects in Acute Alcoholism.... 164
Hyoscyamus, Further Facts concerning Alkaloids.... 242
Hyperæmia, Artificial, in Treatment of delayed Union.... 568
Hypodermic Injections of Phenic Acid in Rheumatic and General Painful Affections.... 252
Solutions, Sterilization of.... 322
Hysteropexy in Cases of Intractable Retroflexion.... 566

Ichthyol, Antiseptic Value of.... 572
in Abortive Treatment of Erysipelas.... 100
in Erysipelas.... 62
in Gynæcology.... 426, 709
-Zinc Paste in Eczema of Female Genitals.... 851
Icterus due to Retention.... 745
Medical Treatment of, due to Retention.... 694
Impetigo.... 126, 475
Inch-and-a-Half Incision and Week-and-a-Half Confinement in Appendicitis.... 196
Incus, Removal of Tympanic Vertigo by Removal of.... 561
Index Medicus.... 868
Indian Medical Congress.... 288
Infantile Therapeutics.... 625
Influenza, Aconite and Digitalis in.... 261
Inguinal Adenitis.... 425
Injection of Serum from Convalescents in Pneumonia and Typhoid Fever.... 365
Inoculations with Septic or Toxic Agents in Malignant Neoplasms.... 634
Insane, Chloralose not Efficient in Treatment of.... 739
Intermittent Fever.... 465
Chronic.... 467
International Medical Congress, Therapeutics at.... 694
Intestinal Anastomosis (with Senn's Plates) for Cancerous Obstructions.... 279
Approximation.... 495
Indigestion with Fermentation.... 404
Obstruction.... 138
Intestine, Ruptured, accidentally.... 637
Intoxication with Lysol and Carbolic Acid.... 412
Intracerebral Hemorrhage.... 116
Intralaryngeal Therapeutics.... 614
Intranasal Operations, Remote Results of.... 721
Intraocular Injections of Antiseptic Substances as a Therapeutic Measure.... 405
Therapeutics.... 423
Intratympanic Operations.... 48
Intubation of Auditory Canal for Stenosis and Furuncles.... 349
Intussusception, Acute, in Children.... 192
Invalids most benefited at Atlantic City.... 6
Iodine.... 612
Iodoform in Tuberculous Phthisis.... 757
Value of an Ethereal Solution of, in Hemorrhoids.... 763
Iridectomy in Ulcers and Abscesses of Cornea.... 422

PAGE

Irido-Choroiditis, Continuous Current in Acute ... 481
Iron Absorption ... 537
Treatment of Chronic Hypertrophic Rhinitis with Perchloride of ... 253
Ischio-Pubiotomy ... 63
Itching ... 186, 256
Ivy-Poisoning ... 770
Izal ... 628

Jackson, W. Fred., Pneumonia treated by Ice-Cold Applications 725
Jacobi, A., Local Treatment in Diphtheria ... 145
Jejunostomy, New Method of performing ... 195
Joints, Treatment of Sprains and Disabled ... 857
Jones, W. S., Unusual Morbid Growths in Nose and Mouth ... 159

Keen, W. W., Surgical Treatment of Pott's Disease ... 1
Enormous Oval Hemorrhoid encircling the Anus; Whitehead's Operation; Entire Cure ... 233
Kidney, Action of Drugs upon ... 8

Laine, D. T., Cholecystenterostomy, with Remarks on Intestinal Anastomosis and Exhibition of a New Approximation Button ... 76
Lateral Sinus, Operative Treatment of Thrombosis ... 136
Lavage, Dr. Salinger's Article on ... 791
in Treatment of Gastric Disorders ... 592
Laws, Geo. C., A Plea for Venesection ... 806
Lead-Poisoning treated by Monosulphate of Sodium ... 542
Leg Ulcers ... 704
Legumine as a Substitute for Milk Diet ... 646
Lenses, Value of ... 423
Ligatures, Elastic, in Laparotomies ... 673
Lithotrites, Good Results following Modern Antiseptic Treatment of ... 280
Liver, Antitoxic Function of ... 611
Extirpation of Left Lobe of ... 570
Punctured Wounds of ... 641
London Letter ... 215, 285, 357, 431, 646, 789
Lueck, G. W., Five Cases of Acute Nephritis in Children, with Special Reference to Pilocarpine in the Treatment of ... 733
Lupus Vulgaris ... 34
Special Method of applying Thermo-Cautery in Certain Cases of ... 204
Lymphadenitis, Venereal ... 427
Lysol ... 562

Macher, Dr., Strychnine in Snake-Bite ... 517
Magnesium Sulphate, Value of Hypodermic Injection of, as a Purgative ... 736
Magnet Operations for Extraction of Iron from Interior of Eye 485
Major Amputations, Technique of ... 705
Malakine: New Antiseptic ... 331, 477
Malaria and its Therapeutics ... 841
Quinine in ... 262
Malarial Cachexia ... 617
Fever, Methylene-Blue in ... 163
Malignant Disease, Value of Caustics in ... 575
Mammary Abscess ... 71
Massage in Prurigo ... 264
of Lens for Artificial Ripening of Cataract ... 49
Mastoid, Trephining and Surgical Anatomy of Temporal ... 49
Meat Diet for Gout ... 263
Mechano-Therapy in Chronic Diseases of Heart ... 848
Menstruation, Vicarious ... 854
Mercury, Absorption and Elimination of, when administered by Inunctions ... 199
Hypodermic Administration of ... 843
Methyl-Blue in Cancer ... 706
Methylene-Blue in Malarial Affections ... 407
Methylene-Blue, True Value of, in Malarial Fever ... 403
Metritis, Acute ... 427
Metrorrhagia ... 858
Mexican Plants, Pharmacology of ... 577
Migraine ... 334
Military Surgery, Impending Revolution caused by the New Infantry Rifle ... 142
Milk, Boiled, as an Article of Diet ... 403
Mitral Stenosis ... 148
Montgomery, E. E., Sacral Resection, with Removal of Uterus, Ovaries, Posterior Wall of Vagina, Perineum, and Lower Part of Rectum; Fæcal Fistula; Anæmia; Retroflexion of the Uterus ... 219
Urethral Caruncle; Curetting for Abortion; Pessaries ... 505
Morphine Habit ... 766
taken with Suicidal Intent; Recovery ... 610
Hypodermically as a Means to Prevent Prolapse of Iris in Simple Extraction ... 483
Permanganate of Potassium an Antidote to ... 472
Poisoning ... 94
Atropine for Chronic ... 101
Morris, Malcolm, Introduction to a Discussion on the Management of Eczema ... 667
Mouth, Care of, in Sick Persons ... 477
Murphy Button ... 780
Acute Intestinal Obstruction; Anastomosis with ... 108
Muscular Advancement, New Process of Simple ... 420
Effort, Influence of Sugar and Tobacco on ... 628
Myelitis ... 697
Myomata, Ligation of Uterine Arteries ... 424
Myxœdema and Thyroid Extract ... 541

Naphthol ... 692
Naso-Pharyngeal Adenoids, Choice of Anæsthetic for Removal of ... 835
Treatment in Ocular Affections ... 557

PAGE

Neck, Subcutaneous Extirpation of Tuberculous Lymph-Glands ... 785
Nephritic Colic ... 468
Nephritis ... 461
in Surgical Aspects ... 574
Pilocarpine Treatment of ... 733
Nerve, Compression of Phrenic, as a Therapeutic Measure ... 344
Substance, Injections of, in Insane ... 112
Suture of Median ... 494
Neuralgia, Epileptiform Trigeminal, treated by Horsley's Operation for Neurectomy of Inferior Division of Fifth Nerve ... 351
Prophylaxis of Post-Amputation ... 361
Syphilitic ... 270
Neurasthenia ... 671
Neuritis, Peripheral ... 609
New-Born, Depression of Skull in ... 273
Nipple Fissures ... 461
Nipples, Prevention of Cracked ... 343
Nitrate of Strychnine in Alcoholism ... 175
Nitrites ... 692
Nitrous-Oxide Gas, Death from ... 115
Nose and Mouth, Unusual Morbid Growths of ... 159
Bleed and its Treatment ... 548

Obesity, Electrical Treatment of ... 475
treated by exclusively Nitrogenous Diet and Copious Libations of Warm Water ... 30
Obstetrics, Asepsis ... 322
Ocular Affections, Subconjunctival Injections in ... 560
Œsophagotomy for Removal of Foreign Bodies ... 276
Œsophagus, Cicatricial Narrowing of ... 534
Stenosis of ... 495
Stricture of ... 496
Oil of Biniodide of Mercury in Ocular Manifestations of Syphilis ... 482
Washing Out the Large Intestine with ... 466
Olive Oil in Nephritic Colic ... 180
Ophthalmia, Granular ... 482
Neonatorum ... 422, 720
Legislation for Prevention of Blindness from ... 457
Ophthalmic Hemicrania ... 559
Ophthalmology: Address in, Medicinal Ocular Therapeutics ... 521
Notes on Some New Drugs Useful in ... 652
Therapeutic Contributions of, to General Medicine ... 51
Opium in Laryngeal Stenoses of Children ... 629
Orchitis complicating Mumps ... 492
Double Septic, complicated by Peritonitis ... 644
Organic Extracts ... 272
in Different Forms of Atrophy of Optic Nerve ... 132
Osborne, Edwin, Amputations and Mechanical Restorations ... 516
Osteomalacia treated by Chloroform Inhalations ... 247
Otitis Media, Chronic Suppurative ... 424
Oxalic Acid as an Emmenagogue ... 173
Oxygen in Therapeutics ... 184
Ozone Preparations, Physiological Action of ... 332

Paget's Disease of the Nose ... 491
Palsy, Infantile ... 698
Papain and Pepsin, Digestive Action of ... 416
Para- and Orthochlorphenol in Tuberculous and other Diseases 626
Paraldehyde Habit ... 39
Paralysis of Ocular Muscles ... 132
Paris Letter ... 501
Passive Congestion, Method of treating Strumous Diseases of Extremities by ... 271
Hyperæmia, Treatment of Tubercular Joints by ... 425
Peat Wool in Surgery ... 638
Pelvic Exudate ... 775
Neuralgia, Surgical Intervention in ... 56
Penis, Fractured ... 564
Pennyroyal-Poisoning ... 757
Pental ... 191, 555
Pepsin Lavements in Dysentery ... 544
Peritoneal Adhesions, Operation of ... 861
Peritonitis ... 336
in Women ... 274
Tubercular ... 415
Permanganate of Potassium as an Antidote to Morphine ... 260
for Morphine-Poisoning ... 241
Peroxide of Hydrogen as a Hæmostatic ... 171
in Conjunctivitis ... 165
in Membranous Throat-Affections ... 29
Pessaries ... 505
Phenacetin in Rheumatism ... 539
Phlegmasia Alba Dolens, Potassium Nitrate in ... 830
Phlyctenular Kerato-Conjunctivitis ... 268
Phthisis, Antipyretic Pills for ... 264
Creosote for ... 752
Dietetic Treatment of ... 344
Laryngeal, with Dysphagia ... 264
New Method of Treatment of Pulmonary ... 751
Treatment of Laryngeal ... 750
Treatment of Night-Sweats of ... 626
Pigmentation of Skin during Exhibition of Arsenic ... 551
Piles, Thrombotic ... 271
treated by Koso-Budki's Modification by Chrysarobin ... 557
Pilocarpine Hypodermically in Facial Erysipelas ... 154
in Acute and Chronic Urticaria ... 849
in Erysipelas ... 289
in Ménière's Disease ... 746
Piperazin ... 608
as a Uric-Acid Solvent ... 625
Influence of, on Urine, especially on Uric-Acid and Urea Excretion. Untoward Effect of Large Doses of the Drug 86
Pirogoff's Amputation, Modification of ... 768

PAGE

Pityriasis Capitis ... 785
Pleurisy, Acute ... 747
Pleuritic Effusions ... 597
Pleuritis, Cure of ... 40
  Use of Salicylate of Sodium in ... 101
Pneumonia ... 41, 176
  Fibrinous, the Treatment of, by Large Doses of Digitalis ... 188
  treated by Ice-Cold Applications ... 725
  Treatment of Croupous ... 845
Pooley, Thomas R., Action of Hydrochlorate of Scopolamine on the Eye ... 160
Porro's Operation for Osteomalacia ... 424
Potassium Bichromate as a Remedy in Gastric Affections ... 609
  Cyanide ... 334
  Formula for Administration of Iodide of ... 427
Potts, Charles S., Quinine as a Remedy for Enuresis ... 217
Pott's Disease, Treatment of ... 856
  Surgical Treatment of ... 1
Poultice, Cold, as an Antipyretic in High Grades of Fever ... 838
  Hot Bichloride ... 575
Pratt Method of Hysterectomy ... 354
Pregnancy complicated by Heart-Disease ... 329
  Toxæmia of ... 183
  Vomiting ... 278
Prescriptions ... 192, 336, 354, 417, 419, 463, 465, 543, 617, 637, 695, 708, 709, 753
Prostate, Double Castration for ... 710
  Castration for Hypertrophy of ... 502
  Emergency Treatment of Urinary Retention from Enlarged Hypertrophied, Castration of ... 276
Prostatic Enlargement ... 404
Prostato-Cystotomy ... 738
Pruritus ... 428
  Vulvæ ... 66
Psoriasis, Acute ... 245
Puerperal Infection ... 275, 644
  Septicæmia ... 851
Pulmonary Tuberculosis, Crude Petroleum in ... 682
  New Treatment of ... 746
Purulent Ophthalmia ... 476
Pyrexia and its Treatment ... 669

Quinine Amblyopia ... 684
  as a Remedy for Enuresis ... 217
  External Use of, in Blennorrhoic Ophthalmia ... 483
  Hypodermic Injection of the Salts of ... 120
  in Pregnancy ... 402
Quinsy, Abortive Treatment of ... 332

Randall, B. Alex., Cases suitable for Excision of Drumhead and Ossicles ... 81
Rectal Incontinence and its Cure by Torsion ... 497
  Surgery, Fifty Cases of ... 631
  Tube, Dangers of Long ... 777
  Ulcerations ... 545
Recti Muscles, Advancement of, by Folding Method ... 268
Rectum, Iodine administered by ... 456
  Malignant Disease of ... 254
  Prolapse of, Physiological Rest in ... 854
  Salicylic Acid administered by ... 264
  Ulceration ... 429
Reed, Boardman, Classes of Invalids most benefited at Atlantic City ... 6
Renal Insufficiency ... 30
Replantation ... 781
Resorbine: New Ointment Base ... 644
Reviews ... 67, 143, 207, 281, 356, 430, 499, 575, 717, 786, 862
Revolver Wound of Skull ... 860
Rheumatic Joints, Ointment for ... 546
Rheumatism, Chronic ... 407
  Collodion in ... 551
  of Joints, Absorption of Salicylic Acid through the Skin and Treatment of Acute ... 102
Rhinoscleroma in Switzerland ... 782
Rhythmical Traction of Tongue as a Means of resuscitating the Asphyxiated ... 61
Rubidium, Iodide of ... 460
Ruck, Karl von, Hydrotherapy in Treatment of Pulmonary Tuberculosis ... 728

Sacral Resection ... 219
Sacrum, Osteoplastic Resection of ... 772
Salicylated Stuffs ... 253
Salicylic Acid, External Applications of ... 428
  Oxytocic Action of ... 615
  Colloid, Treatment of Lupus by ... 335
Saline Solution in Severe Hemorrhage during Abortion ... 36
  Transfusion ... 174
Salines in Cholera, Hypodermic Injection of ... 120
Salinger, Julius L., Lavage in Treatment of Gastric Disorders ... 592
  Pilocarpine Hypodermically in Facial Erysipelas, with a Report of Cases ... 154
Salol as an Intestinal Antiseptic ... 43
  in Cholera Diarrhœa ... 40
Salpingo-Ovaritis ... 562
  Non-Operative Treatment of ... 62
Salt, Subcutaneous Infusion of Common, for Acute Anæmia ... 249
  Water, Case of Tuberculous Empyema cured by Injections of Concentrated ... 748
Santonin, Case of Urticaria produced by ... 624
Sarsaparilla, Therapeutic Value of ... 243
Savage, G. H., On the Treatment of Neurasthenia ... 671
Scarlatina ... 739
Scarlet Fever ... 265
  Patients, Disinfection of, before Completion of Desquamation ... 677

PAGE

Schweinitz, E. A. de, Trikresol as an Antiseptic for Collyria ... 443
  G. E. de, Address in Ophthalmology ... 521
Sciatica ... 762
Scleroderma ... 191
Scopolamine ... 680
  on the Eye ... 423, 480
Scorbutus in Infancy ... 631
Sea-sickness treated by Chlorobrom ... 608
Seiss, Ralph W., Remote Results of Intranasal Operations ... 721
Seminal Vesicles, Chronic Inflammation of ... 769
Senn's Method of Ileo-Colostomy, using Plates made from Turnip-Cabbage ... 642
Septic Osteitis in Childhood ... 770
  Thrombosis of Lateral Sinus ... 65
Serum, Artificial, for Hypodermic Injection after Severe Surgical Hemorrhage ... 120
  of Immunized Dogs in Tuberculosis ... 100
Shoulder, Old Luxations of ... 200
Shoulders, Extirpation of, especially in Regard to Sarcoma of Humerus ... 201
Single-Suture Operations for advancing Rectus ... 136
Skin Cancer ... 64
  -Grafting in Malignant Growths ... 422
  Local Therapeutics in Diseases of ... 741
  Pigmentations Incident to Pregnancy, Ointment of ... 491
Small-Pox, Exclusion of Daylight in ... 191
  treated by Mercurial Baths and Inunctions ... 110
Sodium, Beneficial Results of Salicylate of, in Infantile Tetanus ... 330
  Naphtholate (Microcidine), and Trichloracetic Acid in Ear- and Nose-Work ... 347
  Phosphate and Alkaloids, Incompatibility of ... 334
  Nitrite as a Therapeutic Agent ... 544
Soziodol in Diseases of Ear and Upper Air-Passages ... 487
Sparteine in Chloroformization ... 744
Spina Bifida ... 562
  Cure of, by Iodine Injections ... 475
Spinal Cord Surgery ... 636
  Surgical Intervention in Injuries of ... 571
Spine, Lateral Curvature of ... 711
Splenectomy ... 770
Squint, Internal ... 194
  Operations, Excision of a Piece of Muscle ... 53
Stengel, A., Nature, Diagnosis, and Treatment of Pernicious Anæmia ... 376
Stewart, D. D., Influence of Piperazin on Urine, and especially on Uric-Acid and Urea Excretion. Untoward Effect of Large Doses of the Drug ... 86
Still-Born Infants, Use of Hypodermics of Alcoholic Stimulants for Resuscitation of ... 730
Stimulants ... 766
Stomach, Chronic Ulcer of ... 98
  Erosions ... 620
  Fistula in Child ... 774
  Operative Treatment of Perforative Ulcer of ... 859
  Prescription for Ulceration of ... 470
  -Tube, What can be done in the Diagnosis and Treatment of Gastric Diseases without ... 587
Stone, Charles Granville, Venesection ... 297
Stone impacted in Ureter ... 640
Strabismus, Correction of ... 483
Stramonium Intoxication ... 179
Stricture, Internal Urethrotomy for ... 707
Strophanthus in Exophthalmic Goitre ... 120
Strychnine as a Cardiac and Respiratory Stimulant ... 75
  in Snake-Bite ... 517
  Nitrate in Dipsomania ... 576
  on the Pancreas ... 472
Subconjunctival Injections of Mercuric Bichloride in Various Ocular Affections, with a Report of Fifteen Cases so treated ... 20
  of Sublimate in Ophthalmic Practice ... 193, 481
Sublimate, Subconjunctival Injections of, in Ocular Therapeutics ... 558
Sulpho-Naphthol, Surgical Uses of ... 429
Sulphur in Diphtheria ... 330
Summer Diarrhœa of Children, Sulphate of Magnesium in ... 98
Suprapubic Cystotomy complicated by Adhesion of Peritoneum to Symphysis ... 201
  Lithotomy, Lateral Lithotomy, and Litholapaxy in Young Males, Comparative Safety of ... 487
Surgical Operations, Preparation of Fingers and Nails for ... 701
Sycosis, Suppurative ... 274
Symphyseotomy ... 843
Syphilis, Aphorisms in ... 140
  Hereditary ... 716
  Hypodermic Injection in ... 327
  Use of Mercurials ... 390
  Influence of Abortive Treatment of, on Nervous System ... 853
  Malignant Indian, treated with Thyroid Extract ... 639
  Precocious Treatment of ... 532
  Preventive Treatment of ... 281
  treated by Injections of Calomel ... 490

Tape-Worm in Children ... 617
Taylor, Cyrus F., Alcoholism; the Treatment and Cure of the Disease ... 238
  William J., Amputation of Both Legs at the Knee-Joint for Paralytic Club-Foot in a Case of Spina Bifida, and Complicated by Congenital Inguinal Hernia ... 822
  Trephining for Middle Meningeal Hemorrhage without Fracture of Skull ... 654
Tenorrhaphy by Means of Wide Catgut Sutures ... 497
Tenotomy ... 54
  of Ocular Muscles ... 138
Testicle, Introduction of an Artificial ... 491
Testis, Retained ... 704

PAGE

Tetanus, Idiopathic, treated with Subcutaneous Injections of Eserine Sulphas ... 632
Immunity, Experimental Research concerning ... 141
Tincture of Aconite in ... 527
treated with Serum or Tetanus Antitoxine, Twenty-seven Cases of ... 129, 607, 676
Thiaform ... 561
Thiol in Erysipelas ... 627
Thiosinamin, Hypodermic Injections of, Valueless in Tuberculosis of Larynx and Lungs ... 330
Injections of, in Lupus ... 645
Thoracic Surgery, Present Status of ... 60
Thornton, E. Q., Advantages of Amorphous Phosphorus over Official Form ... 19
Thyroid Extract ... 639
Glycosuria from ... 762
Feeding in Psoriasis ... 600
Gland in Myxœdema ... 645
Tinctura Ferri Chloridi in Typhoid Fever ... 700
Tobacco Habit ... 504
Toe-Nail, Ingrowing ... 568
Ingrown, and its Surgical Treatment ... 55
Tongue, Excision of, and Submaxillary Glands, Ligature of both Lingual Arteries ... 460
Removal of, for Cancer ... 702
Rhythmical Traction of, in Treatment of Asphyxia ... 737
Traction of, in Hysteria ... 753
Treatment of Apparent Death by Rhythmical Traction upon ... 784
Tonic Mixture ... 264
Tonsil, Tuberculosis of ... 564
Tonsillitis ... 432
Tonsils, Electro-Puncture of ... 781
Toxines, Treatment of Malignant Growths by ... 528
Trachoma ... 268
Traction in Treatment of Hip-Joint Disease ... 441
Transfusion ... 605
Traumatic Shock ... 685
Trephining for Middle Meningeal Hemorrhage without Fracture of Skull ... 654
Trichina Spiralis, Infection by ... 608
Trichloracetic Acid as an Ideal Cauterant ... 349
Trifacial Neuralgia ... 279
Trikresol: A New Germicide ... 456
Antiseptic Value of ... 494, 703
as an Antiseptic for Collyria ... 443
Trional ... 468
Troches ... 678
Tubercular Diathesis, Possible Relationship between, and Nitrogenous Metabolism ... 819
Peritonitis ... 454
treated by Insufflations of Air ... 410
Treatment of, by Injections of Camphorated Naphtol ... 783
Tuberculin in Treatment of Phthisis ... 438
Tuberculosis, Metallic Iodine in ... 744
Present Position of Creosote Therapy in ... 266
Turpentine in Diphtheria ... 751
Tympanic Complications of Children's Diseases ... 348
Typhoid Fever ... 684, 753, 838, 839
complicated by Gangrene in Both Legs ... 644
Hemorrhage in ... 648
treated with Lactophenin ... 412
Treatment of Intestinal Hemorrhage in ... 455

Ulcer, Perforation of a Chronic, of Duodenum successfully treated ... 565
Ruptured Gastric ... 621
Ulcers of Cornea complicated with Hypopyon ... 72
treated by Curetting ("Raclage") and Antiseptics ... 134
of the Leg ... 199
Phagedenic Syphilitic ... 561
Umbilical Stump, Aseptic Dressing of ... 493
Uræmia ... 343
Ureter, Abdominal Hysterectomy in which, was Resected and Implanted into the Bladder ... 565

PAGE

Ureter, Successful Reimplantation of, into Bladder ... 497
Ureters, Surgery ... 137
Urethane ... 109
Urethra, Operative Treatment of Ruptured ... 707
Urethral Caruncle ... 505
Discharge, Persistent ... 496
Urethritis, Chronic ... 351
Efficacious Method of treating ... 635
Uric Acid, Turpentine Vapors and the Elimination of ... 741
Urine, Clinical Remarks on Certain Changes observed in, in Myxœdema after Administration of Glycerin Extract of Thyroid Gland ... 33
Crystalline Deposits in ... 622
Effect of Mercurial Treatment on ... 459
Incontinence of, in Children ... 556
Urticaria ... 536
Uterine Fibroids, Electrical Treatment of ... 768
Uterus, Antiseptic Powder in Cancer of ... 427
Cancer of ... 689
Catheterization of ... 58
Gastro-Hysteropexy as a Safe and Reliable Means of correcting Prolapsus and Retro-Displacements of ... 493
New Method of reducing Backward Displacements of ... 645
Removal of Large Fibro-Myomas by Perineo-Vaginal-Rectal Incision of ... 646

Vagina, Traumatic Atresia of, with Hæmotokolpos and Hæmatometra ... 56
Vaginal Anus ... 775
Cœliotomy ... 782
Hysterectomy with Clamps or Ligatures ... 634
Vaginismus ... 278, 755
Vaginitis, Treatment of, as pursued at Hospital Saint-Lazare ... 858
Vagino-Fixation, Technique and Indications of ... 854
Valvular Gastrostomy with a Mucous-Membrane Lining ... 563
Varicocele ... 141
New Way of tying the Veins ... 251
Surgical Treatment of ... 355
Veasey, C. A., Use of Subconjunctival Injections of Mercuric Bichloride in Various Ocular Affections ... 20
Venesection ... 297, 806, 844
Puerperal Eclampsia treated by ... 695
Ventricles, Tapping of Lateral ... 575
Ventro-Fixation of Uterus ... 491
Veratrum Viride as a Remedy in Puerperal Eclampsia ... 415
Vesical Epithelium, Impermeability of Healthy, with Reference to ... 755
Papilloma of Unusual Duration ... 706
Vesico-Vaginal Fistula treated by Operation from within the Bladder ... 780
Vomiting of Pregnancy ... 770
Vulvæ, Treatment of Herpes and Folliculitis ... 859

Walnut Leaves in Scrofula ... 540
Warts ... 198
Internal Administration of Arsenic for ... 129
Washburn, W. H., Strychnine as a Cardiac and Respiratory Stimulant ... 75
White, J. William, and Wood, A. C., Treatment of Empyema ... 508
An Address on Appendicitis ... 385
W. Hale, An Address on Pyrexia and its Treatment ... 669
White Swelling of the Knee ... 709
Whooping-Cough, Bromoform in ... 173
Therapeutic Notes on ... 658, 848
treated with Quinine ... 226
Williams, P. Watson, Diabetes treated with Extract and by Grafts of Sheep's Pancreas ... 649
Wolff, L., Status of the Hypodermic Use of Mercurials in the Treatment of Syphilis ... 309
Womb, Action of Salicylic Acid on the ... 101
Women, Contraction of Urethra in ... 58
Wool Fats ... 572
Wrist-Joint, Excision of, by a New Method ... 713

Xerophthalmos cured by Suture of Eyelids ... 562

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SEASONABLE SUGGESTIONS.

With the opening of the winter season, and its attendant bronchial and pulmonary troubles, we are having from many sections reports of a recurrence of the La Grippe epidemic which for the past six or seven years has afflicted the country.

This fact makes particularly pertinent a recalling of the salient points of Dr. V. W. GAYLE's paper, first published in the *Medical World*, in the midst of La Grippe's most malignant visit. It will be well to note closely his recommendations and experience in connection with the recurrence of the epidemic which is now apparently upon us. He says: "This disease by proper treatment of an attack can be so modified as to be almost aborted. If not properly managed, influenza is particularly liable to grave complications, even in mild cases the tendency is towards prostration, and often the nervous shock is such as to materially debilitate the patient. Where there is much angina, with acute bronchial irritation, the following is indicated:

℞ Ammon. Chloridi . . . . . ℥ij.
Potassii Chloras . . . . . ℥j.
Tinct. Ferri Chloridi . . . . . ℥ij.
Syr. Simplex . . . . . ℥ij.
Aquæ . . . . . q. s. ft. ℥iv.

M. Sig.—Teaspoonful in sweetened water every four hours; also apply to the throat with probang every three hours.

"Quinine is the best germ destroyer we have for the microbe of influenza. During the recent epidemic I aborted quite a number of cases with antikamnia and quinine in combination; also with antikamnia and salol. The relief obtained by the administration of antikamnia alone, where the cephalagia was severe, as in the majority of my cases, was wonderful. When the pain seemed almost intolerable I have seen a ten-grain dose banish it.

"Mustard pediluvia are of great advantage, and a plaster of mustard and lard, one part of the former to two of the latter, applied directly to the chest, answered admirably as a mild counter-irritant.

"Expectorants are often needed, and antikamnia should be administered with them, thus:

℞ Antikamnia (Genuine) . . . . . ℥j.
Syr. Senega . . . . . ℥j.
Vini Ipecac . . . . . ℥iij.
Syr. Tolutan . . . . . q. s. ft. ℥ iv.

Mix, and let stand until effervescence ceases.
Sig.—Teaspoonful every two hours.

"The mild chloride of mercury in minimum doses often repeated will be beneficial. The following prescription is a favorite of mine.

℞ Hydrarg. Chlo. Mit. . . . . gr. j.
Sodii Bicarb. . . . . ʒj.
Lactopeptine (Genuine) . . . . . ℥ss.
M. ft. Chart No. X.
Sig.—One every hour until all are taken, followed by a full dose of hunyadi janos water."

"Antikamnia and Quinine Tablets," containing 2½ grains each of antikamnia and quinine, also "Antikamnia and Salol Tablets," containing 2½ grains each of antikamnia and salol, offer the best vehicle for exhibiting these combinations, giving one every two or three hours.

Gayle concludes his paper as follows: "What is mostly needed is an antithermic analgesic to relieve the pain and reduce the fever. These properties are found in antikamnia. This, with the germ destroyer quinine, is all that I really needed in the treatment of this disease. I advocate the use of stimulants in nearly every case. They are frequently needed in the onset of the disease. Sprays of carbolic acid, turpentine, or resorcin are frequently efficacious in the laryngeal troubles. The diet should be light and easily digestible. By careful attention and avoidance of exposure, together with the line of treatment mapped out, the vast majority of cases will recover. Of course, there are occasional cases which present symptoms which require other remedial agents, but these of necessity must be left to the discretion of the medical attendant."

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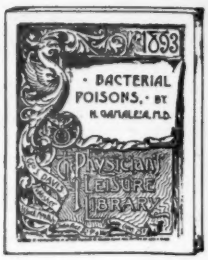

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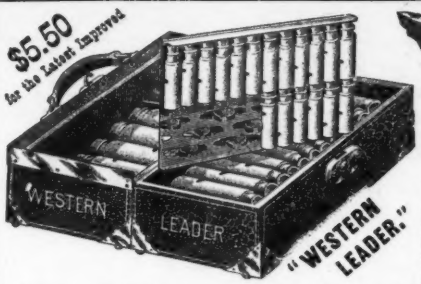

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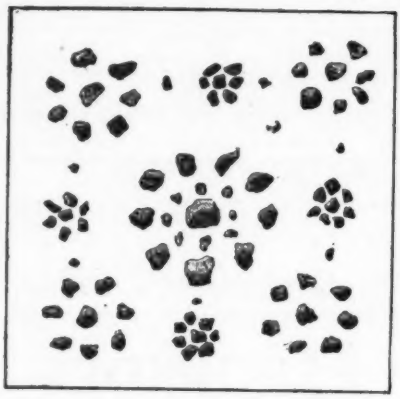

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A Treatise on Diphtheria.

. . . BY . . .

H. BOURGES, M.D.

TRANSLATED BY E. P. HURD, M.D.

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Translator's Preface.
Author's Preface.
Diphtheria—History.
Etiology and Bacteriology.
The Diphtheria Poison.
Secondary Infections in Diphtheria.
The Pseudo-Diphtheritic Bacillus.
False Diphtherias.
Animal Diphtheria.
Symptoms: Of Bacillary Infection; of Systemic Poisoning.
Complications Due to Secondary Infections.
Clinical Forms.
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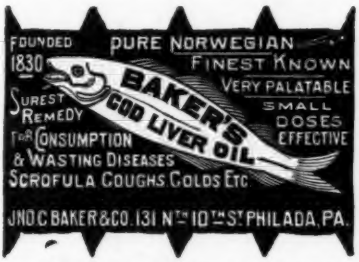
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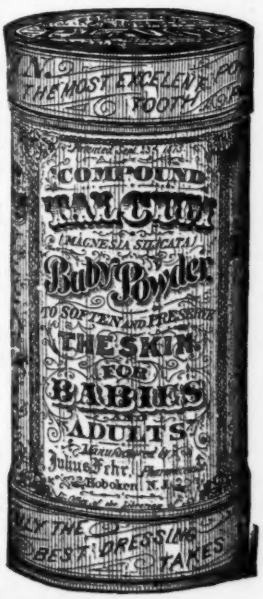

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Obstetric Calendar	16	Differential Diagnosis of Eruptive Fevers	30
Poisons and Antidotes	16– 17	Weights and Measures	31– 39
Posology	18– 23	Materia Medica	41–226
Thermometry	23– 24	Appendix (dose list of Pills, Triturates, etc.)	227–384
Facts regarding Children	24– 26	Formulæ for Official Preparations	229–244
Incompatibility	26– 27	Index	385–400

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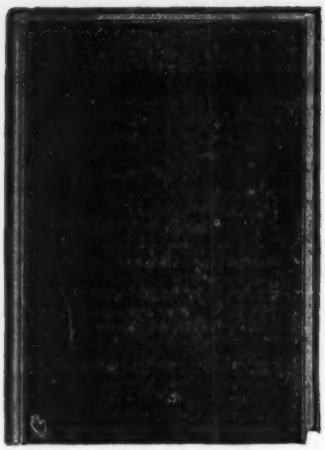

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BY

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UNIVERSITIES OF PENNSYLVANIA AND GOTTINGEN,

Member of the Royal College of Surgeons, England; Assistant Demonstrator of Surgery, University of Pennsylvania; Surgeon to the Out-Patient Departments of the Episcopal and Children's Hospitals; Assistant Surgeon to the Orthopedic Hospital.

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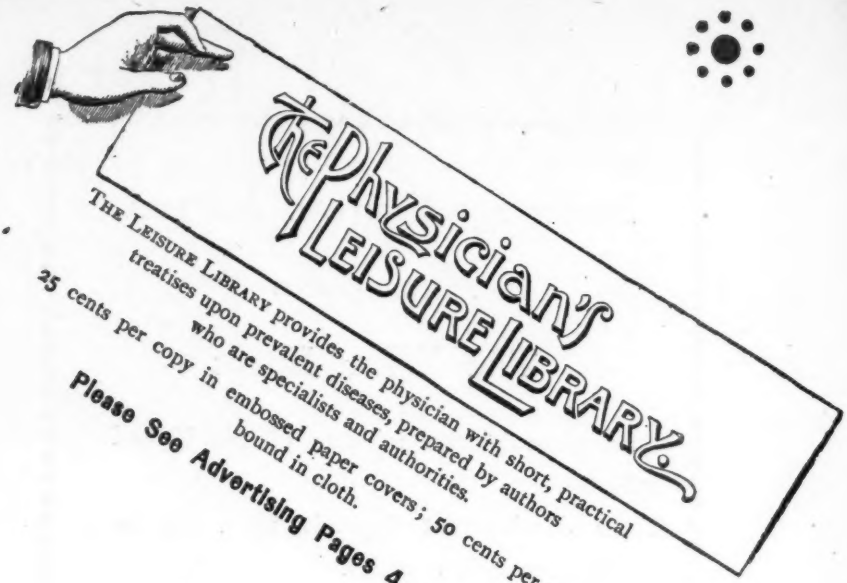
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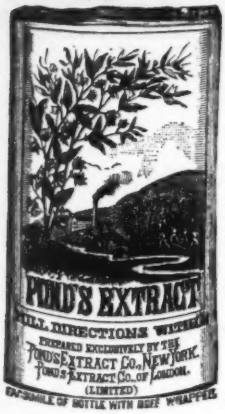

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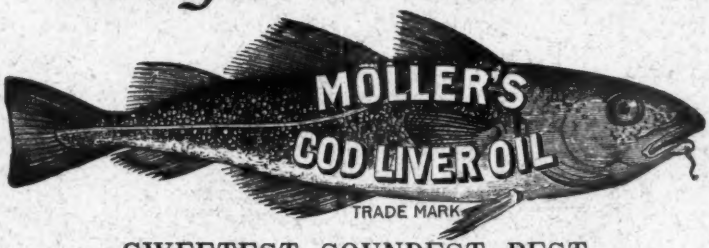

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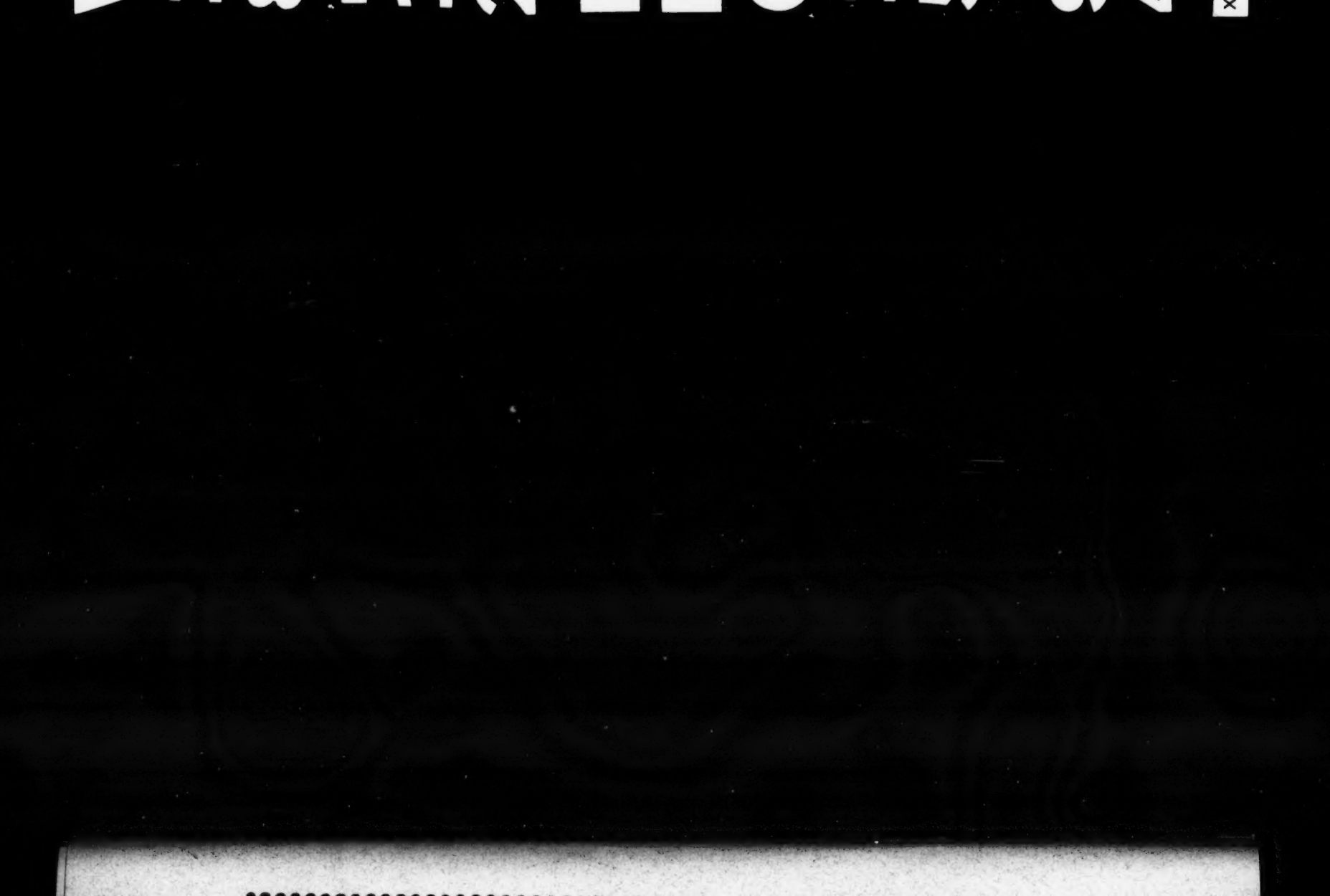
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